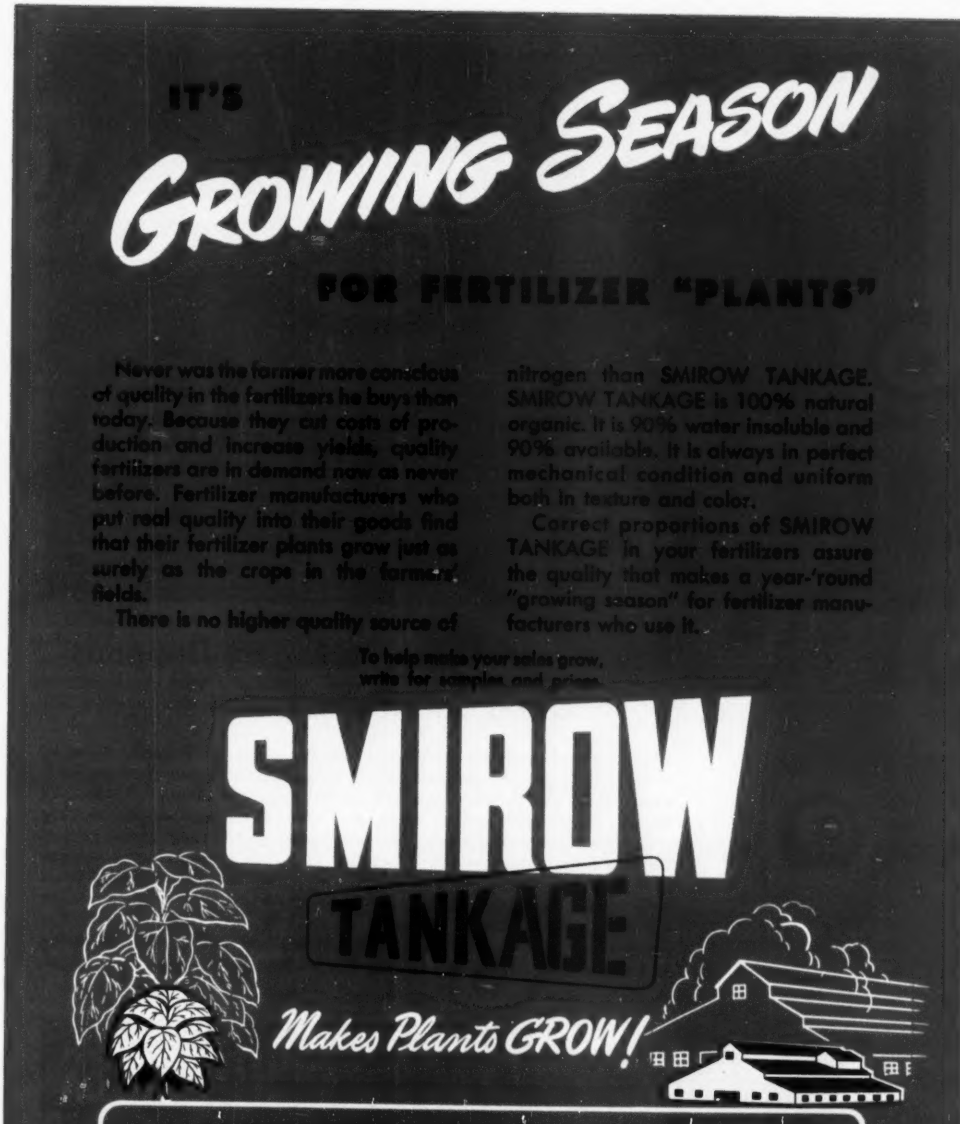
COMMERCIAL FERTILIZER

CONSOLIDATED WITH THE FERTILIZER GREEN BOOK

NOVEMBER, 1952


IT'S
GROWING SEASON
FOR FERTILIZER "PLANTS"
Never was the farmer more conscious of quality in the fertilizers he buys than today. Because they cut costs of production and increase yields, quality fertilizers are in demand now as never before. Fertilizer manufacturers who put real quality into their goods find that their fertilizer plants grow just as surely as the crops in the farmers' fields.
There is no higher quality source of nitrogen than SMIROW TANKAGE. SMIROW TANKAGE is 100% natural organic. It is 90% water insoluble and 90% available. It is always in perfect mechanical condition and uniform both in texture and color.
Correct proportions of SMIROW TANKAGE in your fertilizers assure the quality that makes a year-'round "growing season" for fertilizer manufacturers who use it.
To help make your sales grow, write for samples and prices.
SMIROW
TANKAGE
Makes Plants GROW!
SMITH-ROWLAND COMPANY
Norfolk, Virginia
Chemical, Illinois

High-analysis fertilizer + Ammonium Sulphate pay off in high seed corn quality and increased yield for Seem Seed Co., Zionsville, Pa.

● Joseph T. and Benjamin L. Seem, operating the Seem Seed Co. at Zionsville, Pa., are thoroughly sold on the performance of Ammonium Sulphate, both in high-nitrogen complete fertilizers and as a supplementary nitrogen material for direct application.

In their hybrid seed corn operations, the Seem Brothers plow down 700 to 800 lbs. of a 10-10-10 or its equivalent to improve the nutrient level of the soil. At planting time, they add an application of 100-150 pounds of 10-10-10 in the rows. When the crop is well along, the Seem Brothers now also side dress with 300-500 pounds of Ammonium Sulphate as a direct application.

This scientific fertilization program with Ammonium Sulphate has increased the average seed corn yield from a previous 60 bushels per acre to 100 bushels. In addition, test weights are higher and seed quality is excellent.

The Seem Brothers report equally good results from the use of Ammonium Sulphate on seed wheat and barley. From an investment standpoint, the return from the increased yield is many times over the fertilizer cost.

BENJAMIN L. SEEM JOSEPH T. SEEM

Bigger yields for farmers mean better business for you

● As more and more farmers turn to U·S·S Ammonium Sulphate—in high-nitrogen fertilizers and for direct application—to increase both the quantity and quality of their crops, demand goes up and up.

Be ready to meet this demand by using U·S·S Ammonium Sulphate to supply a major part of the nitrogen content in your high-nitrogen complete fertilizers. And supplement your line by selling U·S·S Ammonium Sulphate in 100-pound bags for direct application.

For complete information on U·S·S Ammonium Sulphate, contact our nearest sales office or write directly to United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S AMMONIUM SULPHATE

2-999

UNITED STATES STEEL

COMMERCIAL FERTILIZER

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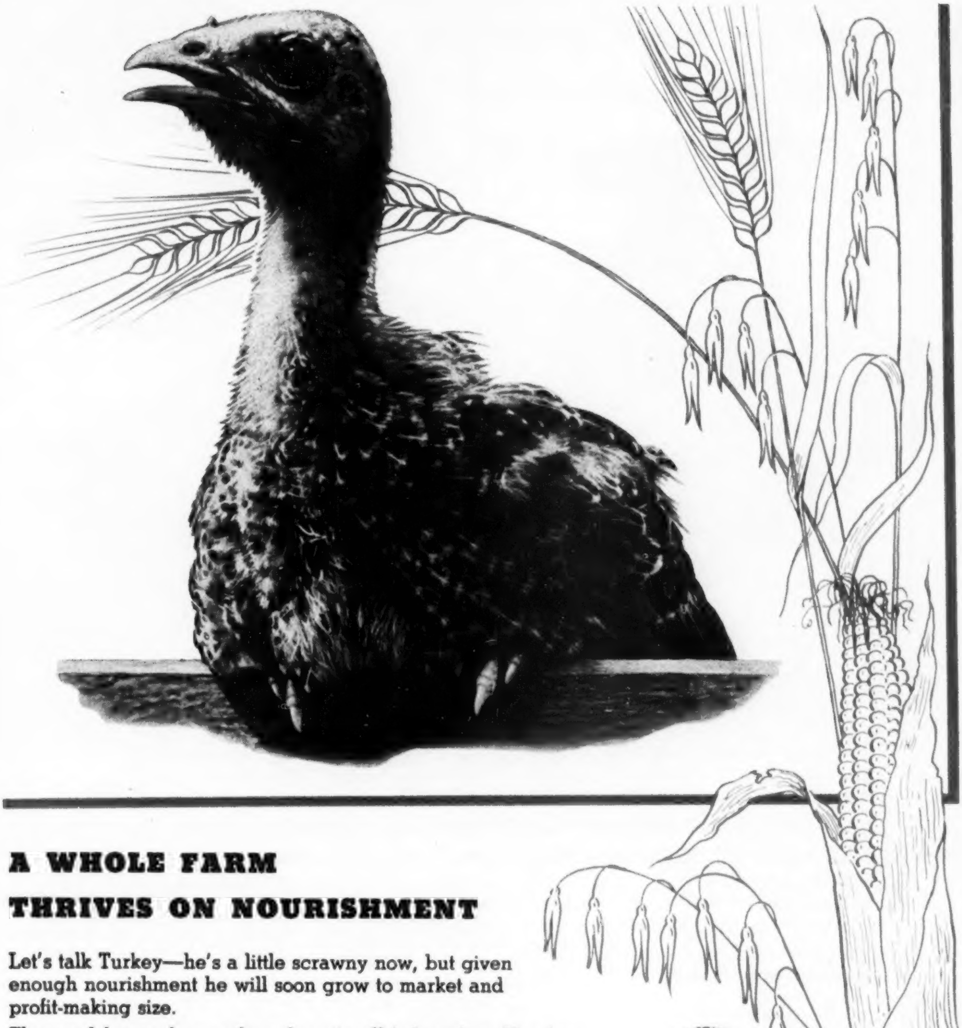

JUST AROUND THE CORNER

By Vernon Mount

A WEEK BEFORE ELECTION, I'm setting this down so that my glee or regret won't show through, as it well might if I wrote after election. But for the most part, by the time you read this, the citizenry will have shrugged its collective shoulders, and decided everything will be all right. The folks are pretty worn out from their unusual effort of minding the nation's business, and glad to get back to such normalities as the celebration of Be Kind to Pickles Week.

ONLY THE PRESSURE GROUPS will remember the burning issues, and each group will remember only one issue--their own. The problems of Korea; Communists-in-the-secret-files; Support for crops; Support for silver; Support for the aged and the infirm; Support for practically everything except the man who really wants to forge his own future...all these will become the President's problem. And the average citizen will go back to the routine of daily living, with the radio and television, and paper-backed novels as his chief source of excitement.

BUT THE PRESIDENT will really have his hands full--cleaning up and trying to keep permanently clean the operation of government; trying to get Korea settled without bringing on a world war; trying to cut taxes without losing the worth-while things those taxes buy; trying to please the common people without wrecking business; trying to avoid the depression which has hung over us since 1945.

I STILL WONDER why any man wants to be president of the United States, because if he is an honest, earnest man, he can't really enjoy it.

Yours faithfully,

Vernon Mount

THREE ELEPHANT BORAX
REG. U.S. PAT. OFF.
THREE ELEPHANT
AGRICULTURAL
PENTAHYDRATE BORAX
COMPOSITION Contains a minimum of 44% B_2O_3 or approximately 121% equivalent Borax.
ADVANTAGE More economical because the Borate in this form is more concentrated.
PURPOSE To correct deficiency of Boron in the soil.
RECOMMENDED USES As an addition to mixed fertilizer, or for direct application to the soil.
FOR CORRECT APPLICATION Consult your local County Agent or State Experimental Station.
POTASH
TRONA
SALTS
TRONA
MURIATE OF POTASH
IMPORTANCE Muriate of Potash is a vitally important ingredient which provides the soil nutriment so essential in the formulation of good mixed fertilizers.
PURPOSE To help resist plant diseases and enhance the productivity of crops.
TO ASSURE EFFECTIVE RESULTS Specify "Trona" Muriate of Potash . . . made by the pioneer producers of Muriate in America.
AMERICAN POTASH & CHEMICAL CORPORATION
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ATLANTA 3, GEORGIA
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LIKE BEMIS FERTILIZER BAGS

SHEETING BAGS BUILD FERTILIZER SALES!

Bemis Dress Print Fertilizer Bags Provide Garments for the Entire Family!

New York Designs Wind Up in Alabama Style Show

Mr. Dallas Greer, who uses Mountain Brand Fertilizer on his farm, poses with his wife and daughter . . . all three are wearing garments made from Bemis H-C print patterns. Pleased customers like the Greers help get still more customers for Mountain Brand.

The experience reported by Mr. T. W. Allen, president of the Sand Mountain Fertilizer Company, of Attalla, Alabama, is typical. He gave a trial-size order for Bemis H-C Dress Print Bags for the well-known Mountain Brand Fertilizer. Sales results were so good that *within three weeks he placed three more orders . . . all very large ones.*

Now, Mr. Allen says, "Any manufacturer would be mighty happy to get the percentage of gain we got. Customers don't mind the slight premium price, because the same high-count cotton fabric would cost them several times as much at the neighborhood store. And those New York-designed Bemis prints certainly please the women."

Bemis BEMIS BRO. BAG COMPANY

General Offices — St. Louis 2, Mo.
Sales Offices in Principal Cities

USDA Opportunities For Chemists, Chemical Engineers

Vacancies currently exist for chemists and chemical engineers in the Division of Fertilizer and Agricultural Lime, Bureau of Plant Industry, Soils, and Agricultural Engineering, United States Department of Agriculture, Beltsville, Maryland. Appointment to these positions is anticipated by certification of eligibles from the appropriate GS-5, GS-7, GS-9, GS-11, and GS-12 registers of the United States Civil Service Commission, Washington 25, D. C. For chemists the applicable optional fields are inorganic, physical, and general chemistry. Basic annual entrance salaries of these grades are $3,410, $4,205, $5,060, $5,940, and $7,040, respectively. Annual increases are provided by law to the maximum of the grade for employees whose services meet prescribed standards of efficiency, and in addition, advancement to higher grades depends largely on the individuals ability.

Applicants appointed to these positions will plan, direct, conduct, or assist in planning and conducting laboratory and pilot-plant investigations involving applied and fundamental chemical and chemical engineering research and development in the field of fertilizer technology with the objective of developing new and improved fertilizers and fertilizer materials, and processes for their economic production. Duties of the appointees will include the design of experiments, collection, examination, and interpretation of experimental data and will require a working professional knowledge of the laws, principles and concepts of chemistry, and the ability to apply them in the case of chemist appointees and of chemical engineering in the case of chemical engineering appointees. The difficulty of the work performed and the responsibility assumed will vary with the grade of the position.

Qualified persons interested in these opportunities for employment in fertilizer research work are urged to file Form 57 for the applicable examination (Chemist, Announcement No. 325; Engineer, Chemical, Announcement No. 301) with the United States Civil Service Commission, Washington 25, D. C., and to advise the Division of their interest. Further information may be obtained by contacting the Division by mail, by phone or in person. Calls should be directed to Tower 6400—Extension 350 between the hours of 8:00 A.M. and 4:30 P.M., Monday through Friday.

It Seems to Me

by BRUCE MORAN

From time to time in "Around the Map" we report what we have come to call "neighbor trouble" which represents complaints of fumes, odors, stream pollution and other things which can make a chemical plant a bad neighbor. But this happens so rarely as to rate as news. If it were a common thing, we probably would not bother to print it.

Watching these neighbor trouble stories, we observe that eventually ruffled feathers are smoothed, and the plant is built, or goes on running. But sometimes it takes a flying trip by the top brass (a recent case) bearing oil for the troubled waters in the form of solemn assurance that the plant is equipped with all the known gadgets to stop odors or pollution of air or water.

There is a point here. A little public relations work in advance might save a lot of legal trouble and expense, and bring the new plant or the old plant into more harmony with the neighbors. They want your payroll in their town. They can be made proud of your overall contribution to the economy of the area. They can be made to understand in advance that your odors and fumes and waste have all had their fangs drawn. And you can enter the community like any other respectable industry.

And, of course, if your plant does smell bad . . . fix it before the neighbors take legal steps!

INDUSTRY CALENDAR

Date	Organization	Hotel	City	State
Nov. 10	Conditioner	Plaza	New York	N. Y.
Nov. 10-12	CFA	Desert Inn	Palm Springs	Cal.
Nov. 17	Application	Netherland Plaza	Cincinnati	Ohio
Nov. 18-21	Am. So. of Agronomy	Netherland Plaza	Cincinnati	Ohio
Nov. 19-21	NFA	Roney Plaza	Miami Beach	Fla.
		1953		
Jan. 20	Ga. PFES	U of Ga.	Athens	Ga.
Jan. 21	Ga. Sect., ASA	U of Ga.	Athens	Ga.
March 1	Sou. Safety Sec.	Biltmore	Atlanta	Ga.
July	Canadian	Algonquin	St. Andrews	N. B.

HIGHLIGHTS OF THE NFA PROGRAM
1952—A YEAR OF IMPRESSIVE ACHIEVEMENT

By Russell Coleman
President, The National Fertilizer Association

No year in the history of the more than century-old fertilizer industry has been more significant or has held more promise than 1952. Never before has the term "chemical fertilizer" taken on such importance in the eyes of the people of the United States. The preliminary estimate of The National Fertilizer Association indicates that the Nation's consumption of chemical fertilizer for that year exceeded the use in 1951, which marked the 13th consecutive 12-month period of ever increasing use of the industry's product by American farmers.

Of even greater importance, however, is the bright outlook for an impressive development in plant-food use. The stage for this expansion is already set. In establishing USDA's Fertilizer and Lime Utilization Program in cooperation with the Land Grant Colleges in September, Secretary of Agriculture Brannan and President R. F. Poole pointed out that if we are to feed our mounting millions of people, fertilizer use must be vastly increased. By 1955 use of nitrogen should be upped 70 percent; phosphoric acid, 55 percent; and potash, 51 percent, over 1951.

No greater future ever faced an industry. Effective execution of this program demands, first of all, an expansion of the industry's production facilities and second, an intensified program of education among the millions of farmers as to the advantages of sound fertilizer utilization. To the fulfillment of both of these goals, The National Fertilizer Association, with headquarters in the Nation's capital, has dedicated energetic attention. Every phase of the problem has been attacked; every solution is being sought. This is only proper for NFA, with its 400 members—and the number is steadily growing—represents in its trade association activities a broad cross section of the entire industry.

A Program of Service

Through its series of Service Letters, NFA has not only kept members informed of the industry's production achievements, but also through its promptly issued EMERGENCY NOTES it has made available immediate information on government orders and on short and long range projects for the future as well as timely information on developments within industry units.

NFA has been quick to recognize, in addition, the importance of making available to the industry information on the latest experimental work in the field of fertilizer processing and manufacturing. In doing this, NFA believes it assists the industry in meeting its production responsibilities more efficiently and more effectively. Working relationships with the Tennessee Valley Authority, the USDA, and other Federal as well as State organizations are continually being developed and improved. As a result, a better understanding of the place which each agency and our industry can take in developing improved fertilizer programs is being evolved.

The demand for the monthly publication FERTILIZER PROCESS PROGRESS, the first issue of which was issued in February, 1952 and which contains some of the major findings descovered through this joint enterprise, is testimony to the need for and interest in this type of activity. The chief channel through which the work is being carried on is the Chemical Processing and Manufacturing Subcommittee of NFA's Plant Food Research Committee.

The interest aroused in more efficient processing and manufacturing has also been shown by the unprecedented attendance at the Committee panel discussions at the Association's conventions.

Bankers Program

As vital as these industry educational services are, The NFA has also given full attention to the ever greater responsibility for informing the public about proper fertilizer use.

Since bankers constitute a vital link in the agricultural economy, NFA has instituted a Bankers Program whereby it presents to their organizations information about the importance of chemical plant food to the farmer and to his community. In a lecture at the 1952 School of Banking at the University of Wisconsin, sponsored by the Central States Conference, Walter B. Garver, Manager, Agricultural Department of Commerce of the United States, presented much pertinent information which had been assembled by NFA and was based on interviews by NFA staff members with leading authorities in State agricultural colleges.

Stimulated and assisted by NFA, the Ohio Bankers Association is about to issue to its members a booklet containing facts especially adapted for that State and entitled "Ohio Soil Fertility—Profit Prospects for Bankers." For the Nation's banks as a whole, another booklet is planned which should do much to show those interested in agricultural invest-

ments about the full importance and common benefits from sound fertilizer use. The whole program is in its infancy.

Other Educational Work

As a sevice especially designed for dealer use, NFA has developed a new device—a Plant Food Meter. Its popularity is demonstrated by the heavy demand already experienced. Consisting of a sliding chart in a plastic pocket case, the meter shows, on one side the amount of plant food removed from the soil by representative crops; on the other, it reveals the quantities of the three primary plant foods which can be returned to the soil by various leading grades and products. Dealers and others in the fertilizer business are in a position to serve their farmer customers better when equipped with this instrument.

NFA, a pioneer in the grasslands promotion program in America, continues its efforts in this direction. Having helped to marshal the support of various States for this activity in 1950 and 1951 by urging Governor's proclamations of State Pasture Weeks and making awards available for special achievements within the States, NFA in 1952 offered trophies to the county agent in each State who did most during the year to advance the cause of grassland farming. This project was carried on in cooperation with the Extension Service, U. S. Department of Agriculture, and the awards will be presented to the winners at the Annual Convention of the National Association of County Agricultural Agents in Chicago, December 2.

In addition, NFA lent a helping hand in preparations for and execution of the successful Sixth International Grassland Congress at the Pennsylvania State College in August.

Motion Pictures

Two sound-and-color motion pictures have been produced by NFA during the year and are being made available on a loan basis and sale to all those interested—to its members, farmers, farm organizations, agricultural colleges, civic clubs,

Russell Coleman

television stations, and a multitude of others.

The first, THE GRASSLANDS MIRACLE, dramatically shows the advantages of a well-rounded pasture program for adequately feeding the Nation's stock and hence, its growing population and, at the same time, reveals the tragic results from poor grasslands practices.

The second, CASH IN ON CORN, which is scheduled to have its premiere at NFA's fall convention, demonstrates the merits of high-yield as opposed to low-yield corn crops, from the standpoints of both profit and soil conservation.

Books

A feature of NFA's program, engaging the present attention of the staff, which will not come to fruition for sometime to come, is the publication of a book on the home garden, including the proper care and nutrition of lawns, ornamentals, vegetables and fruits. With 256 pages of text, 36 pages of natural color photos and many black and white illustrations, preparation of this volume is on its way and should be an invaluable aid to the suburban garden enthusiasts and to those who guide them in their work.

Many established NFA projects continue to enjoy widespread support. The demand for the volume HUNGER SIGNS IN CROPS never seems to reach a saturation point; the requests for agricultural pamphlets come in every mail; orders for the colorful "Making Pastures Pay" letterheads arrive in a steady stream.

"At Your Service"

The renamed NATIONAL FERTILIZER REVIEW, with its newly instituted natural colored cover and its increased number of pages and circulation, enjoys widespread popularity. So continues, also, the serving of farm publications with articles stressing the function of fertilizer in our expanding economy. NFA members are in greater demand for personal appearances before agricultural meetings throughout the Nation.

Indeed, as each day passes, NFA fulfills in ever enlarging measure its pledge to be AT YOUR SERVICE which, incidentally, is the title of the Association's new membership booklet.

It is not difficult to understand, therefore, why the two 1952 NFA conventions at White Sulphur Springs and at Miami Beach attract the attention of record-breaking numbers. Members, their guests and their friends come not only to hear the inspirational talks by leaders in agriculture and industry, but also to learn more and more about the service, the social pleasures and all the other benefits which mark the forward progress of NFA, one of the oldest and one of the most progressive among trade associations.

Return Safety Questionnaires Promptly

Fertilizer association leaders have joined the active heads of the Fertilizer Group of the National Safety Council in a request that the Safety questionnaires, now being mailed, be promptly answered and returned. There are only three questions, and they are all important in guiding the development of a program that will be most useful to the industry in cutting the present high cost of accidents and fire. A. B. Pettit, Davison Chemical, is chairman of the committee mailing the questions.

HIGHLIGHTS OF THE NFA PROGRAM

Looking Forward

WITH THE FERTILIZER INDUSTRY

By P. H. Groggins*

REVOLUTIONARY changes are taking place in the fertilizer industry. In many respects the upheaval is long overdue. From a technical viewpoint, the production of fertilizers has not kept pace with other segments of the chemical industry. Compared with the process industries, such as rubber, rayon, plastics and petroleum refining, it is woefully behind in the adoption of continuous processes and automatic controls. Stimulated by emergency conditions and promises of greater future markets, foundations for a larger and more efficient fertilizer industry are now being laid. When the blueprints have been translated into structures, the fertilizer industry will probably emerge as a robust hybrid. It will reflect features of the chemical and petroleum industries which are being grafted on to the old fertilizer plant.

In the Southeast, where fertilizer plants are most numerous, the industry grew up in a leisurely environment. Until the outbreak of World War II, labor was relatively cheap and there was no organized effort to improve economic conditions. Most of the larger manufacturers appeared to be content with the slow but steady increase in business. The frequent entry of dry mixers into the field was observed but it was not sufficiently annoying to stimulate new and more efficient production and distribution practices. As a consequence this area has a surplus of production facilities and an overlapping of distribution channels. Notwithstanding the injection of new ingredients into the hitherto placid fertilizer industry, it is likely that the Southeast will be least affected by the changes destined to occur.

When the Korean incident focused attention on the inadequacy of our sulfur supplies for current and future needs, the position of the independent fertilizer mixers became precarious. The producers of superphosphate could, if they desired, impose temporary hardships on dry mixers by drastically curtailing deliveries. If serious distribution problems had developed, it would have been necessary for NPA to issue orders to remedy the situation. The fact remains, however, that the acidulators have not embarked on a program to eliminate the small fertilizer mixer from his insecure position in the industry. A more searching inquiry reveals that the current practice on the part of acidulators to follow historic patterns of distribution is not altogether altruistic. To a large extent it is necessary and wise. It provides a time factor for reflection, planning, negotiation and action. Continuation of existing producer-customer relationships makes possible a constructive evolution rather than a revolution which would unnecessarily leave in its wake many bankrupt small operators.

Factors in Changing Position

The factors leading to the present ferment in the fertilizer industry are numerous. Each has a specific leavening effect. It's the combination of pressures from within and without that necissitate prompt action by those now in the fertilizer industry if they are to safeguard or improve their position. The basic stimulus for change stems from the Department of Agriculture's determination that fertilizer production needs to be expanded enormously to maintain or improve nutritional standards for a rapidly growing population. These are figures showing 1950 use and 1955 claimed requirements of the major plant nutrients:

	1950: Tons	1955: Tons
Nitrogen, N	1,210,000	2,185,000*
Phosphates, P_2O_5	2,088,000	3,485,000
Potash, K_2O	1,082,000	2,185,000
	4,380,000	7,855,000

*Based on NPA supply data and DPA program determination. Does not include conversion loss of 132,000 Tons N.

These figures indicate an increase of about 79 percent in the planned use of fertilizers in a 5-year period. Realization of such a consumption would be a revolutionary rather than evolutionary development. Educational programs, incentives and other devices will probably have to be employed to create a market for such a great fertilizer output.

There is no question but what we will have a steady increase in our population and hence a bigger problem in producing adequate supplies of foodstuffs. It is know also that we have just about reached the limit in the utilization of our good tillable acreage. We must depend now on the agricultural sciences and chemicals to produce more and more food on our farmlands for future expanded needs. The contributions of plant breeders, soil scientists, agronomists and entomologists can be expected to result in the development of improved varieties and more efficient farm practices. The chemical industry which supplies plant nutrients and plant and animal medicinals must also play a dominant role in ensuring adequate production of food, feed and fiber.

(Continued on page 73)

* Mr. Groggins is Chief, Agricultural Chemicals Section, Chemicals Division, National Production Authority.

The Southeast

CORNERSTONE OF THE PLANT FOOD INDUSTRY

A. H. BOWERS and A. L. WILEY*

"WAY down South in the land of cotton. . . ."—These opening bars of "Dixie" emphasize the prime reason—cotton—for the Southeast's function as cornerstone of the plant-food industry. Dictionaries define the symbolic meaning of "cornerstone" as "something of fundamental importance." Certainly no region has been more important to an industry—and conversely, a few industries have been more important to a region.

Though nowadays the Southeast's agriculture and economy are no longer so absolutely dependent on "King Cotton", the region's early and middle agricultural history were very much involved with this cash crop. In fact, the fat years and the lean years were measured only by the success of the cotton crop. Cotton has popularly been blamed as a soil-depleting crop, and soil depletion has been given as a reason for some of the past economic and social troubles of the South. However, a brief look at the soils and their mode of formation makes it clear that these soils, themselves, were infertile for introduced crops in the first place—and cotton was named the "goat" for their quick exhaustion. The main reason was that agronomic science simply did not develop soon enough to change the course of southeastern agriculture until comparatively recently.

Climate and Soil

Though the South is blessed with a warm, moist climate, ideal for a great variety of crops, that climate is paradoxically unideal insofar as formation of fertile soil is concerned. Heat and moisture — the two "musts" for most chemical reactions—are present in abundance, and over the thousands of years of geological history this abundance has speeded the tearing-down reactions of weathering until Piedmont soils are leached-out remnants of their one-time mineral-rich selves.

In the sandy coastal plain, the parent materials were not particularly rich in plant nutrient minerals to begin with, and the high temperatures and year-round leaching removed most of the nutrients originally present.

Soil organic matter, which acts as a storehouse of plant food in cooler climates, did not accumulate in southeastern soils, since it decomposed almost as rapidly as it was deposited. Reflecting the general low level of fertility was the native forest of pines and oaks—a vegetation of notably low nutrient requirement.

Further, most southeastern soils have a very low exchange capacity, that is, an inability to "hang on" to applied basic nutrients. The red soils also have an insatiable appetite for phosphates, fixing much of that applied in a form unavailable to crops.

On these soils, the early colonists established their cashcrop, plantation-type of agriculture, with cotton the main money crop in the deep South, and tobacco and peanuts in the upper South.

Early Fertilizer Use

Prior to the year 1860, there was little or no attempt at maintenance of soil fertility with fertilizing materials as such, although the industry was having its beginnings in Baltimore and small quantities of Peruvian guano were imported as early as 1832. Nitrate of soda was used but little until after the Civil War. Farm manures and cottonseed and hulls were recognized by the more progressive farmers for their fertilizer value as indicated by correspondents to the Patent Office Reports of 1854:

From Virginia: "The fertilizers most used in this vicinity are stable, barnyard and hog-pen manures, with stubble, grass, clover and weeds of grain lands turned under in the fall."

From Florida: "We have done but little yet in the way of manuring, except with cottonseed, and such as naturally accumulates in our stables and lots."

From Georgia: "But little manure of any sort has been applied to the fields of the country. The scanty scrappings of our tables and barn yards are spread on a few acres, and cottonseed, which abounds in nitrogen, is extensively used for enriching the lands on which is grown Indian corn."

From Louisiana: "No manures are used in this parish except cottonseed and that from our cattle yards; and very few take the trouble to save the latter."

A note of concern is evident in some of these statements—concern that barnyard manures and crop residues were either insufficient, poorly used, or both.

An early reference to the use of sulfate of ammonia (then imported prepared from England) also reflects this concern. In an 1845 issue of The Southern Planter, the following recommendation was made in this publication's "Hints to Landlords and Tenants":

"Sulphate of ammonia is better

* Agronomist, Chicago, Illinois, and Manager, Atlanta, Ga., Swift & Company, Plant Food Division.

known to the farmer than any other salts of ammonia, having been a great deal advertised of late by vendors of artificial manures. By economising well the means within our reach, we become, in a measure, independent of the "manure vendors." We have opportunity of noticing the uses to which the urine of animals may be applied, but we cannot here overlook the exterme slovenliness and inattention which are almost universally displayed in the farmyards around us. 'Far-fetched' and 'Dear-bought' as some of our manures are, the farmer continues to buy, whilst he daily witnesses under his own nose, the loss of most valuable manure. . ."

Start of Mixed Fertilizer Use

Cotton and tobacco planters soon found that Peruvian guano alone caused too much vegetative growth in their crops because of its high nitrogen content. When, in the 1860's, it was revealed that guano mixed with acid phosphate held down stalk growth and caused better fruiting, the cotton growers were glad enough to use the mixture. Likewise, when tobacco growers found leaf quality improved, they, too, preferred mixed fertilizers. When potash was added to the mixture still better results were obtained.

Among the Southeast's contributions to the industry is phosphate rock. Contrasted with the pick and shovel phosphate digging of the 70's in South Carolina, are today's huge draglines of the Florida phosphate fields. Some of these can take a 26 cubic-yard "bite."

In this connection Messrs. Kettlewell and Ober of Baltimore in 1859 received a testimonial to their "manipulated guano" from one Edward McGhee of Henderson, Georgia. Wrote Mr. McGhee:

"Sir: Your polite circular was received by due course of mail, and an answer has been withheld until the present in order to give the result of my experience as you say, 'good or bad' in the use of your guano. I purchased last winter of your agents, Messrs. N. A. Hardee & Co., of Savannah, two tons of your Manipulated Guano, No. 2; applied 125 lbs. per acre in the drill; bedded on same; planted in cotton and cultivated in the usual way. The crop thus manured grew off rapidly, commenced fruiting early, and yield ed 60% more cotton in the seed than did lands of a similar character, where no fertilizer was used, without increasing the ultimate growth of the plant. It has paid a large percent on the investment."

"Manipulated guano" was the mixed fertilizer of the day. It was promoted as a competitor of Peruvian guano and was similar in ratio of nitrogen (4-6%) and total phosphoric acid (18-30%) to some present-day mixtures. This was no accident. By trial and error the cotton and tobacco farmers of the Southeast worked out ratios that were so nearly correct that later research work at southern experiment stations only confirmed what the farmers had found. Some enterprising farmers sold "Farm Rights" to formulas they had developed. In 1851, for instance, one J. P. Pittman of Robeson County, North Carolina paid $2.50 for the right to prepare and use the "Southern Fertilizer" for 17 years. This mixture, approximately a ½-½-1 ratio was prepared as follows, according to the "Farm Right" contract:

Recipe for One Ton

1. Take of Stable or Lot Manure 1000 lbs to 1000 lbs. Turf of

One of the Nation's up-to-date mixed fertilizer plants—Swift & Company's at Winter Haven, Florida.

Muck.

2. 12 lbs. of Commercial Saltpetre with 100 lbs of slaked lime.
3. Two bushels of common salt, mixed well with half bushel of oak ashes.

Ready for use in 18 days. Let it stand in the pen or put in barrels. Use 150 to 200 lbs. to the acre. Better than guano for cotton, corn, potatoes, or wheat.

To prepare the fertilizer, build a pen well-sheltered and put in No. 1 one foot deep and level; then add No. 2 one inch deep and level; then sprinkle No. 3 sufficient to cover; then begin again with No. 1, following as above, always ending with a layer of No. 1.

Guano and mixed fertilizers of the 1870's and 1880's were high priced compared to today's products, considering their plantfood content and the comparative purchasing power of the dollar. In 1878 Peruvian guano was advertised at $56 per ton, while a tobacco fertilizer made of powdered fish, bone meal and potash brought $40 per ton. There was a great hue and cry in farm papers over these prices—and interest developed in clovers and peas as home-grown fertilizers. Mourned a correspondent of the Southern Planter in 1887: "We cannot use ammoniated fertilizer without great (financial) loss."

Fertilizer Use Increases

Nevertheless, fertilizer use steadily increased throughout the Southeast, with factories springing up everywhere. By 1876, as an example, 35 percent of North Carolina's cropland received fertilizer. Discovery of the South Carolina phosphate deposits in 1867, the revelation in 1879 that basic slag was a valuable source of phosphorus, and the extensive pyrite deposits in Georgia and Alabama made the South Carolina-Georgia area a "natural" for the industry's development. The number of fertilizer factories listed in the 1894 Census reflects the above factors:

Alabama—8; Florida—3; Georgia—44; Mississippi—3; North Carolina—12; South Carolina—20; Tennessee—4; Virginia—28.

Raw materials included fish meals, dried blood, cottonseed meal, guano and nitrate of soda, as nitrogen sources. Bone meal, acidulated bone, wet base goods, basic slag and 12 percent superphosphate were the principal phosphatic materials while lowgrade imported kainite and manure salts supplied potash requirements. As would be expected from formulating with such materials, the mixtures were low in plant food—though high in aroma.

In 1880 the average available plant-food content of mixed goods in three States was as folows:

	N	P_2O_5	K_2O
North Carolina	1.9	8.6	2.0
Georgia	2.1	9.5	1.4
Alabama	2.2	8.8	1.8

Industry Expands

During the 20 years, 1895-1915, the plant-food industry in the Southeast experienced its greatest period of growth. Tennessee and Florida phosphate deposits began to be exploited at this time, providing ample highgrade phosphate rock as a replacement for the largely worked-out, low-grade South Carolina deposits. The port cities, Norfolk, Charleston, Savannah, Wilmington and Jacksonville became centers of fertilizer production. With the development of the citrus industry and its dependence upon heavy fertilization, Florida's consumption grew rapidly. In 1890 the first factory went into production and by 1912, there were six factories in Jacksonville alone.

Sulfate of Ammonia and "acid phosphate" were being used in ever-increasing quantities, although packinghouse by-products, their animal feed value not yet recognized, were still important raw materials. One meat packer in 1905 featured "Red Corpuscle, Bone and Sinew Fertilizers." Another promoted "Blood and Bone". The appeal of animal base, organic nitrogen-containing fertilizer must have been great, for there is still some demand for it. To this day, the terms "bone" and "fish" and "guano" are found in trade marks of southeastern manufacturers.

The following account gives a view of a typical plant of the 1900's as seen by the editor of the Canton, Georgia, "Cherokee Advance":

"The raw ingredients from which the goods of the Canton Fertilizers are made, are procured direct from their original sources. They get their dried blood and blood and bone tankage direct from the great packing houses in the West, and these contain nothing but pure animal matters. Their cottonseed meal is obtained from southern mills. Fish scrap is shipped direct from

eastern and foreign fisheries. Sheep manure is imported from foreign markets. Their potash salts come from Germany on direct importation. Their nitrate of soda comes from the market of Chile. And phosphate is obtained from very favorable connections and is the very best grade to be had.

"The raw ingredients can be seen in bulk in the plant of the Canton Fertilizer Company before mixing. It was interesting to us to visit this fine plant and examine the ingredients from which they make their goods, before any mixing takes place, and observe their strength and purity. We came away convinced that the goods turned out by this factory are just what the makers claim for them, 'Honest-Made Fertilizers.' Every sack of their goods is tagged under the regulation of Georgia laws, and on each tag may be seen the following in big red letters:

'C F. C. Fertilizers are not a conglomeration of cheap materials in order to reduce the cost of the product but they are a well-proportioned compound of the very best known to the fertilizer trade.' "

Mechanization Goes Ahead

Mechanization was well-advanced in the factory of the 1900's. Many were built with unloading elevators, and rotary mixers, similar to those used today, were either steam or electrically driven. In earlier years mixing was done by merely accumulating a batch of raw materials back of the elevator leading to the bagging machine. Four men with scoop shovels then shoveled the materials into the elevator pit through a grating. The degree of mixing depended on the speed and skill of the shovel wielders. Materials handling was still largely via scoop shovel and pushcart or "Georgia Buggy". Push trucks and dump cars traveling on overhead rails above the bins distributed raw materials and mixed fertilizers around the factories. Immediately after World War I, overhead electric cranes and conveyor belts came into use, along with steel, rather than timber construction in factories.

By 1919, according to the Manufacturers Census, the number of factories had increased as follows: Alabama—40; Florida—24; Georgia—144; Mississippi—9; North Carolina—45; South Carolina—50; Tennessee—10; and Virginia—43.

Turn of the century advertising laid great emphasis on organic raw materials. To the left is a pocket calendar and memo book of 1894. On the right is a 1908 bale of cotton price figuring table.

Consumption Rises

The heavy continuing demands of the Southeast's cash crops made possible this expansion. More and more farmers realized that the only way to maintain their yields was through heavy fertilization. This is reflected in the progression of consumption figures for the years 1901, 1912, and 1920:

From 1921 to 1939 agricultural depression and low prices for cotton caused consumption to decline, with extreme drops during the depressions of 1921 and 1930-35, but World War II and some truly revolutionary changes in southeastern agriculture started another period of increasing consumption.

Factors Affecting Increase

First of these changes was occasioned by discoveries of minor element deficiencies in many crops, including citrus, tung trees, alfalfa, crimson clover, ladino clover, corn, cotton and tobacco. Inclusion of minor elements in plant foods used on

TONS CONSUMPTION BASED ON TAG SALES
(1949-50 Figures from U.S.D.A.; Others from N.F.A.)

	1901	1912	1920	1929	1949-50
Virginia	200,000	372,108	465,247	429,886	728,304
North Carolina	285,578	695,705	1,170,440	1,293,572	1,740,348
South Carolina	293,000	886,222	1,098,487	760,069	874,528
Georgia	457,153	1,103,864	1,003,053	868,911	1,188,036
Florida	37,046	187,927	262,061	427,224	877,955
Alabama	191,583	452,215	374,860	675,450	1,139,773
Mississippi	66,173	119,710	131,084	327,806	640,607
Tennessee	40,048	77,473	98,535	142,745	506,338

these crops in deficient areas have boosted yields and profits far beyond those of the past. Alfalfa, which once was thought merely to be unadapted to the South, is now grown extensively, thanks to boron fertilization. Freezing damage to citrus groves has been greatly reduced by minor-element applications and sprays.

The second major change was in corn fertilization practices. Now, with a heavy mixed goods application at planting time, plenty of nitrogen side dressing, heavier planting rates and adapted hybrids, 100-bushel corn is grown where 25 bushels was tops ten years ago.

Third, and probably most important to the Southeast economically, has been the "Keep the South Green" movement in diversifying the cash crop agriculture with pastures and livestock. Improved permanent pasture acreage in the last 4 years has increased tremendously. North Carolina alone increased Ladino clover pastures from 60,000 acres in 1948 to an estimated 900,000-1,000,000 acres this year. In addition, thousands of acres of temporary winter grazing crops are put in every fall in South Carolina, Georgia, Alabama and Mississippi.

Southeastern pastures must be heavily fertilized during fall seeding and annually thereafter. Temporary winter grazing crops require 600-800 pounds per acre of mixed plant food, plus nitrogen top dressing. This fall market for fertilizers has not only increased total consumption (while cotton and tobacco acreage decreased) but has enabled the plant-food industry to operate more efficiently by taking advantage of a rather long "off season" market. In 1949-50, the eight southeastern States consumed 7,695,889 tons of all fertilizers.

The Future Looks Bright

With the new prosperity and continuing demand old factories are being remodeled and new ones are being built—in some centers the first such new construction since World War I.

In describing these changes in southeastern agriculture, Dr. George H. King, Director of the Tifton, Georgia, Coastal Plain Experiment Station said: "The southeastern farmer is increasing the production on his allotted acres. He is turning what were formerly regarded as 'supply crops' into major sources of income, and he is increasing his livestock holdings. The changes made during the past 10 years, significant as they have been, will in all likelihood be dwarfed by those in the next decade."

This was written in 1950, yet already the plant-food consumption picture is changing. With the post-war expansion of Florida phosphoric acid production, high analyses are coming in, although local custom will prevent the rapid acceptance and demand for such grades found in areas of newer use. In fact, in a South Georgia and North Florida territory served by one plant, both the archaic 3-8-5 and ultra-modern 8-16-16 analyses are found on the price lists.

In 1951, for the first time, flue-cured tobacco fertilizers containing no organic nitrogen were manufactured and sold to growers. In North Carolina, the 3-9-6 grade containing 25 per cent organic nitrogen is no longer favored by the Agricultural Experiment Station and a 4-8-10 without organic nitrogen replaces it. Those not familiar with tobacco country custom may not appreciate what a radical departure this is from ancient and honored practice, but it is typical of the new progressiveness.

"Pointing with pride" at past achievements and "viewing with alarm" the future are old American customs, indulged in by spokesmen for a wide assortment of groups. But the plant-food industry can indeed point with pride at its place in the future of southeastern agriculture.

Soil Conditioner Conference Nov. 10

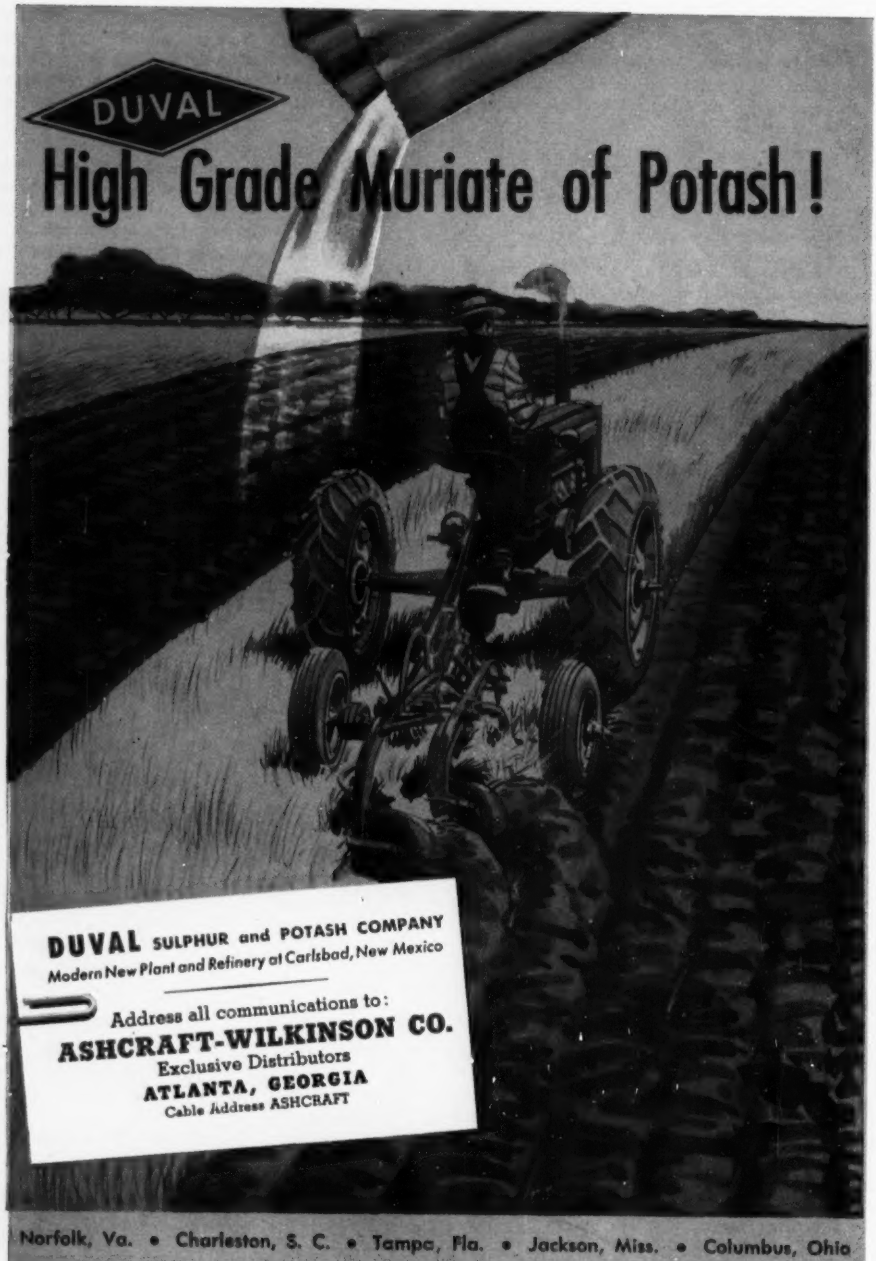
The first national soil conditioner conference ever held has been called for the Hotel Plaza, New York City, November 10. Soil scientists, research men and marketing people will present their findings on chemical soil conditioners, with Richard A. Snelling, of Henry A. Dreer, Inc., as temporary chairman who will be host to the gathering at a luncheon.

The basic purpose of the meeting will be to clarify conflicting claims advanced by producers, and to exchange information on the entire subject. Representatives from USDA, the Federal Trade Commission, the Department of the Interior and many others in agronomy and associated fields at the state level will attend, and between 300 and 400 are expected to be present.

Canadian Producers Consider Secretary-Manager

In mid-October the Canadian Plant Food Producers of Eastern Canada held a meeting to consider the employment of a full-time secretary-manager for their association, together with the necessary staff personnel, and a committee was chosen to go into the subject fully and make recommendations at a future meeting.

The Canadian group will hold their next convention at The Algoquin, St, Andrews-by-the-sea, New Brunswick the first week in July. A. Mooney, president, is sales manager of Canada Packers, Ltd., Toronto.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CALIFORNIA FERTILIZER ASSOCIATION

Program of 29th Annual Convention

THE DESERT INN—PALM SPRINGS
NOVEMBER 10, 11, AND 12, 1952

MONDAY, NOVEMBER 10, 1952

7:30 to 9:00 a.m.—Breakfast Hour, Dining Room, Desert Inn.

8:00 a.m.—Registration, Front Lobby Porch, Desert Inn

CALIFORNIA FERTILIZER ASSOCIATION SESSION

Desert Inn Lobby

9:15 a.m.—Opening Remarks and Introduction of Guests—President S. B. Tatem.

9:30 a.m.—Invocation—Dr. James H. Blackstone.
Minister, Community Church, Palm Springs

9:40 a.m.—Address of Welcome—Charles D. Farrell.
Mayor, City of Palm Springs

9:50 a.m.—Remarks—Sidney H. Bierly.
Executive Secretary and Manager

10:00 a.m.—"Middle West Industry Helps Farmers to Help Themselves"—Z. H. Beers.
Executive Secretary, Middle West Soil Improvement Committee
Chicago, Illinois

10:20 a.m.—"The Water Development Plan for California"—T. R. Simpson.
Professor of Irrigation Engineering, University of California, Berkeley

10:40 a.m.—Short Recess.

10:50 a.m.—"Impressions of Postwar Japan"—William E. Snyder.
Wilbur-Ellis Co., Los Angeles

11:10 a.m.—"Where is all the Fertilizer Going?"—Dr. Russell Coleman.
President, National Fertilizer Assn., Washington, D. C.

11:30 a.m.—"The USDA—Land-Grant-College Fertilizer Use Program"—Paul T. Truitt.
President, American Plant Food Council, Inc., Washington, D. C.

11:50 a.m.—"California's Part in the USDA—Land-Grant-College Fertilizer Use Program"—John J. McElroy.
Director of Programs, Agricultural Extension Service, Berkeley

12:00 noon—Announcements and Recess.

12:30 p.m.—Convention Luncheon, Dining Room.

1:30 p.m.—"Preset Status of the American Enterprise System"—Dr. Lawrence Lockley.
Dean, School of Commerce, University of Southern California
Los Angeles

2:00 p.m.—"Fertilizer Supply Situation"—Weller Noble.
President, Pacific Guano Company, Berkeley

3:00 p.m.—California Fertilizer Association, Business Meeting.

4:00 p.m.—Motion Picture, "The Grasslands Miracle".
Courtesy, National Fertilizer Assn., Washington, D. C.

4:30 p.m.—Board of Directors Meeting—Lobby.

6:00 to 7:00 p.m.—Cocktail Party, Front Porch and Lawn.
Courtesy of Balfour, Guthrie & Co., Ltd.

7:30 to 9:00 p.m.—Dinner Hour, Dining Room, Desert Inn.
(No organized program with dinner. This announcement for attention of those residing at Desert Inn and any others who may wish to have dinner here)

SUNDAY, NOVEMBER 9, 1952

6:30 p.m. Joint Meeting of Board of Directors and Budget Committee at Dinner—Spanish Room, Desert Inn.

TUESDAY, NOVEMBER 11, 1952

Entire Day to be Devoted to Fun and Recreation

7:00 to 9:00 a.m.—Breakfast Hour, Dining Room, Desert Inn.
(For those residing at the Inn, and for any others who may desire breakfast here)

9:00 a.m.—Men's Golf Tournament, Tamarisk Country Club.
(Green Fee—$5.00)

11:00 a.m.—Ladies will leave Desert Inn by Chartered Bus for Shadow Mountain Club, Palm Desert for Cocktails and Luncheon as Guests of CFA.
Bus will Return via Indio Date Palm Gardens and Palm Canyons

1:00 to 2:30 p.m.—Luncheon Hour, Desert Inn Dining Room.
(No organized luncheon program.)

2:00 p.m.—Bridge Tournament, Fiesta House, Desert Inn.

All Afternoon—Swimming, Trail Riding, Tennis, Bowling, Bridge, Canasta, or Just Browsing in the Beautiful Palm Springs Shops. Any activity to Suit Your Pleasure.

7:00 p.m.—Outdoor Steak Broil—Desert Inn—Wear Sport Clothes.
($1.50 per plate extra charge for steak)

LADIES PROGRAM

For Entire Three Days of the Convention

ALL THREE DAYS—Bridge Tables Will be Set Up at Fiesta House on Grounds of Desert Inn, for Bridge or Canasta. Facilities for Tennis, Swimming, Bowling, Golf and Horseback Riding Easily Available.

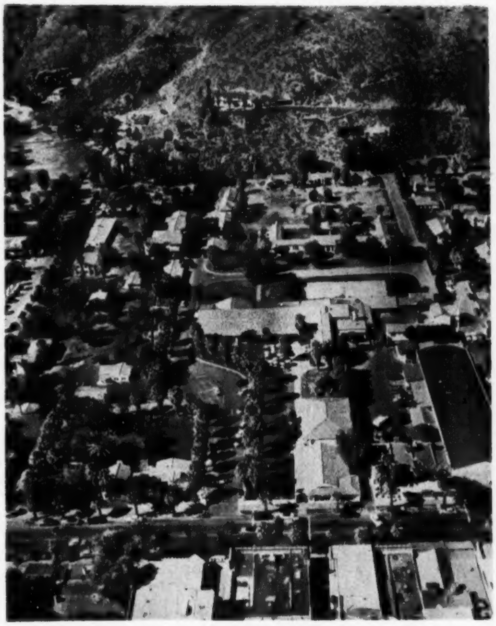
MONDAY, NOVEMBER 10, 1952

8:00 a.m.—Registration, Front Lobby Porch, Desert Inn.

12:30 p.m.—Convention Luncheon, Dining Room, Desert Inn.

2:00 p.m.—Ladies Golf Tournament—O'Donnell Golf Course, Palm Springs. (Green Fee $3.00).

4:30 p.m.—Ladies Putting Tournament—O'Donnell Golf Course. (No Charge).



6:00 p.m.—Cocktail Party, Front Porch and Lawn.

Courtesy Balfour, Guthrie & Co., Ltd.

8:00 to 9:00 p.m.—Dinner Hour, Dining Room, Desert Inn. (No Planned Program).

TUESDAY, NOVEMBER 11, 1952

11:00 a.m.—Ladies Will Leave Desert Inn by Chartered Bus for Shadow Mountain Club, Palm Desert, for Cocktails and Luncheon as Guests of CFA.

Bus will return via Indio Date Palm Gardens and Palm Canyons

7:00 p.m.—Convention Outdoor Steak Broil—Desert Inn—Wear Sport Clothes.

($1.50 per plate extra charge for steak)

WEDNESDAY, NOVEMBER 12, 1952

12:30 p.m.—Convention Luncheon, Dining Room.

2:00 p.m.—Bridge Tournament—Fiesta House.

6:00 p.m.—Cocktail Party, Swimming Pool Patio.

Courtesy American Potash & Chemical Corp.

8:00 p.m.—Banquet, Dining Room, Desert Inn.

Informal Dress

9:30 p.m.—Award All Prizes.

9:45 p.m.—Entertainment and Floor Show.

10:30 p.m. to 12 or 1—Dancing.

7:00 to 9:00 a.m.—Breakfast Meeting of Soil Improvement Committee and Certain of University of California Technical Staff—Spanish Room, Desert Inn.

7:30 to 9:00 a.m.—Breakfast Hour, Dining Room, Desert Inn.

(For those residing at the Inn, and for any others who may desire breakfast here)

California Fertilizer Association Session (Continued)

BUREAU OF CHEMISTRY SESSION

9:30 a.m.—Report of the Year—Allen B. Lemmon.

Chief, State Bureau of Chemistry, Sacramento

10:00 a.m.—"Polyelectrolyte Soil Amendments"—Robert Z. Rollins.

Ass't. Chief, State Bureau of Chemistry, Sacramento

10:30 a.m.—"Protection of Employees"—A. C. Blackman.

Chief Div. of Industrial Safety, San Francisco

11:00 a.m.—"The Future of Fertilizers in the West"—Raymond H. Ewell.

Manager, Chemical Economics Services, Stanford Research Institute

12:00 noon—Announcements and Recess.

12:30 p.m. Convention Luncheon, Dining Room, Desert Inn.

SOIL IMPROVEMENT COMMITTEE SESSION

1:45 p.m.—"Virus Diseases as Distinguished From Soil Troubles on Fruit Trees"—Dr. L. C. Cochran.

Citrus Experiment Station, Riverside

2:15 p.m.—"Soil Fertility Studies in Imperial Valley"—Dr. B. A. Krantz.

Southwestern Irrigation Field Station, Brawley

2:35 p.m.—"Cotton Fertilization"—Dr. D. S. Mikkelsen.

Agricultural Experiment Station, Riverside

2:55 p.m.—Short Recess.

3:05 p.m.—"Fertilizer Studies With Nitric Acid and Nitric Dioxide"—Dr. D. G. Aldrich, Jr.

Citrus Experiment Station, Riverside

3:20 p.m.—"Plant Analysis and Sugar Beet Fertilization"—F. J. Hills.

Agricultural Experiment Station, Davis

3:45 p.m.—"Fertilizing Two for One"—Dr. O. A. Lorenz.

Agricultural Experiment Station, Davis

4:15 p.m.—Announcements and Adjournment.

6:00 to 7:00 p.m.—Cocktail Party—Swimming Pool Patio

Courtesy, American Potash & Chemical Corp.

8:00 p.m.—Banquet—Dining Room. Informal Dress.

9:30 P.M.—Award All Prizes.

9:45 p.m.—Entertainment and Floor Show.

10:30 p.m. to 12 or 1—Dancing.

THURSDAY, NOVEMBER 13, 1952

8:00 to 9:00 a.m.—Breakfast Hour, Dining Room, Desert Inn.

CONTRIBUTORS TO CONVENTION PRIZE FUND

American Cyanamid Company
Atkins-Kroll & Company
Bemis Bro. Bag Company
E. I. du Pont de Nemours & Co.
Fulton Bag & Cotton Mills
George W. Gooch Laboratories
International Paper Co.
Nitrogen Division
Phillips Chemical Co.
Shell Chemical Corp.
St. Regis Sales Corp.
Wilson & Geo. Meyer & Co.

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Advisory—J. M. Quinn, Chairman; Ned Lewis, Wallace Macfarlane, Earl Mog, T. Walter Houser.

Budget—W. E. Snyder, Chairman; W. L. Dixon, Jr., Vice Chairman; Ralph J. Crum, Frank Easton, M. E. McCollam, Murray McNeil, Charles Monoogian.

Constitution And By-Laws—Howard Conley, Chairman; Jack Baker, Howard Houston.

Legislative—Earl R. Mog, Chairman; Ralph J. Crum, Virgil Frizzell, B. H. Jones, W. E. Simas.

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CONVENTION COMMITTEES

Entertainment—Norman Springer, Chairman; Sidney Herzberg, T. H. Lathe.

Ladies—Mrs. Earle (Helen) Shaw, Chairman; Mrs. Sidney (Jane) Herzberg, Mrs. Ned (Mandane) Lewis, Mrs. Norman (Sally) Springer.

Program—Byron Reynolds, Chairman; Charles Carlson, Ned Lewis, Wallace Macfarlane, M. E. McCollam.

OFFICERS

S. B. Tatem, President; B. H. Jones, Vice President; Jack Baker, Secretary; William E. Snyder, Treasurer; Sidney H. Bierly, Executive Secretary and Manager.

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Washington

The new NPA head, R. A. McDonald, says he views it "simply as an operating and service organization" . . . to provide defense agencies and the Atomic Energy Commission with vital materials and production facilities and to assure the civilian economy a fair distribution of what materials remain. "I look on NPA as a business-trained outfit that has been going in the right direction . . . the same policies will continue . . ."

* * *

The Native Sulphur Industry Advisory Committee, October 6, asked that all restrictions be lifted at once, asked NPA to ask OPS to eliminate price controls—"as an incentive to develop additional sources of supply".

* * *

October 7, the Phosphatic Fertilizer IAC asked that December 15 be set as a cut-off date on new applications for certificates of necessity covering new facilities for normal and concentrated superphosphates. They also agreed with the Sulphur IAC's recommendations.

* * *

October 6, Secretary Brannan announced there would be no 1953 marketing quotas or acreage allotments on upland or extra long staple cotton.

* * *

October 7 the USDA announced acreage and production goals on 17 vegetables 3% higher than the harvest of 1952 and 8% above the 1952 acreage. Increases: lima and snap beans, beets, cabbage, cantaloupe, cauliflower, cucumbers, onions, green peppers, tomatoes and watermelons. Decreases: spinach. Same as 1952: carrots, celery, lettuce, green peas and shallots.

THE SULPHUR SITUATION HAS CERTAINLY CHANGED!

Sulphur output will have to be curtailed, to make room for new sources coming on the market, unless government restrictions on shipments are lifted. That is the attitude today. Compare it with the shortage which hampered the whole fertilizer industry just a few months ago.

Put into figures, it looks like this: 1952 consumption is estimated at 6,090,000 long tons, with supply 434,000 above that figure. For 1953—consumption is figured at 6,637,000 long tons, with a 7,000,000 ton supply—which means 363,000 long tons more to go into inventory.

FERTILIZER *Safety* SECTION MEETING

It is a far cry, yet only a short time, since a determined small group began their insistent hammering on the fertilizer industry to awake to the heavy costs in lost time and in insurance premiums of ignoring the safety information available through organization. The Fertilizer Section of the National Safety Congress has become a vital factor in the industry in a few short years.

This was demonstrated by the meeting in Chicago, October 22-23 which was well attended and which offered papers of basic importance to any safety-conscious fertilizer executive.

J. S. Fields, Phillips Chemical, opened the meeting with a general discourse on its purpose. Walter B. Brown, Transmitter Mfg. Co., NYC., talked on "Safety and Communism." Mark Withey, Trojan Powder Company, talked on the demonstration of multiple shot blasting which was described in advance in our October issue. And the afternoon session was concluded with a talk by G. G. Blair, Ebasco Services, Inc. on planned fire prevention in fertilizer plants through design.

The following morning was occupied with the actual demonstration of multiple shot blasting at International Minerals & Chemical's plant.

APFC held a cocktail party and luncheon for officers and the executive committee, and the meeting was resumed after this. Election of officers was the first order of business, and the group elected John Smith, chairman; Vernon S. Gornta, vice chairman; Thomas L. Clark secretary.

The newly elected members of the executive committee, chosen for three-year terms are: J. J. Herring, Southwest Potash; John Mark, Iowa Plant Food Co.; Fred Coffee, Wilson-Toomer; Dewey Lange, Lange Bros.: Lloyd W. Woidiuris, Thurston Chemical; A. Dale Dunn, Gates Brothers; J. C. Watts, Jr., Naco; E. J. Buhner, Buhner Fertilizer; Adolph F. Ecklund, Saginaw, Mich.; H. V. Lehn, I. P. Thomas & Sons Co.; Carl Beth, Smith Agricultural; M. S. Wright, Jr., Texas Farm Products; J. F. McKenna, Lion Oil.

The afternoon program continued on with a discussion of multiple shot blasting by Mr. Withey as a follow-up on the mornings demonstration. "Housekeeping in Fertilizer Plants" by E. O. Burroughs, F. S. Royster Co., and "Gas and Dust Control" by Herbert Walworth, Lumberman Mutual Casualty Co. presented two more phases of plant safety. John A. Stark, of G. L. F.'s Bridgton Jersey Plant, told how to conduct a safety meeting in the plant, and G. G. Blair, Ebasco Services, gave the second section of his subject, "Fire Prevention in Fertilizer Plants Through Maintenance."

Mr. Gornto presided over a meeting following adjournment, to lay preliminary plans for the Southern meeting to be held March 1 in Atlanta.

FIRE PROTECTION (PART 1) IN THE FERTILIZER INDUSTRY

By George G. Blair
Engineer, EBASCO Services

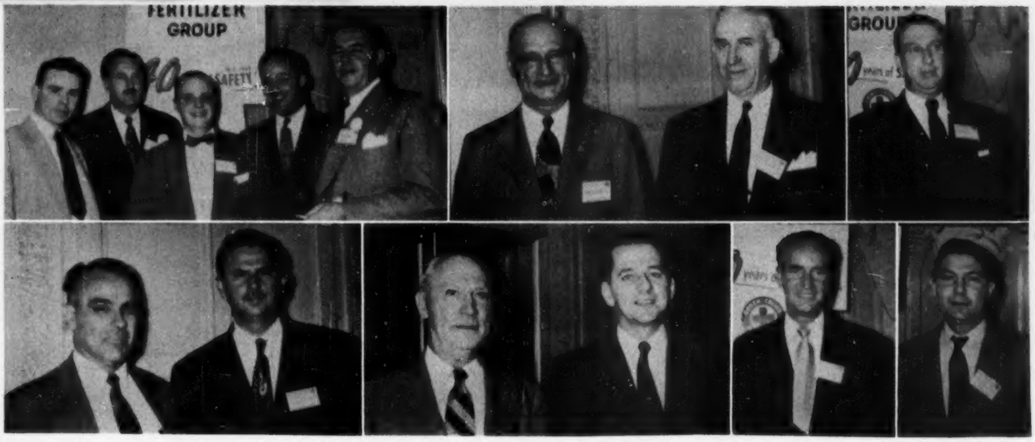
(A Summary of Unfavorable Conditions in the Average Plant and the Remedy Thru Proper Planning of Structure, Equipment and Protectives)

A review of the average Fertilizer Plants seems to indicate either that the industry's founders had little faith in the roles of nitrogen, potash, phosphorus and calcium in plant nutrition, or that they were overly impressed by those who think soil-building is preferable to plant feeding. However, the role of soil nutrients in plant pysiology is well established. The business is not only firmly established, but will expand at no lesser rate than the population. This assured future should warrant design and construction of new plants, or improvement of old plants, to serve for maximum periods at maximum efficiency.

As conditions stand today, some of the new dry-mix fertilizer plants, some of the wet-mix types with acidulation process and perhaps most of the new acid and basic chemical plants are of fire resistive or incombustible construction with a good proportion of the equipment in the open. Under these conditions the fire prevention and protection problem approaches the ultimate in simplicity.

However, the average dry-mix and older dry-mix properties with acid plants present no such favorable picture as evidenced from past inspection experience, and a recent examination of reports and plans covering a major portion of the country.

In general, buildings are pricipally frame, frequently of large area and of a balloon-type construction. The average plant, judged by construction and building arrangement, is subject to from three quarters to total destruction by fire. Many are well segregated from external exposure, but some are severely exposed by other properties. For obvious reasons plants are generally in outlying or rural areas; consequently, public protection is only fair to poor at the properties, probably averaging at best a weak seventh class by National Board grading, whereunder tenth class is



1. Dan Gillings, International Minerals & Chemical Corp., Harry Fick, and Dave Stone, Wm. Stone Sons, Ltd., Ingersoll, Ontario, Bill Morgan, International Minerals & Chemical Corp., G. G. Pittock, Wm. Stone Sons, Ltd. 2. G. G. Blair, Engineer, Ebasco Services, Inc., New York, Vernon Gornto, Smith-Douglas, Norfolk. 3. H. R. Krueger, Phillips Chemical Co., Bartlesville, Okla. 4. E. O. Burroughs, Jr., F. S. Royster Guano Co., J. L. Shopen, Publicity Chairman, Fertilizer Section, National Safety Congress. 5. Walter B. Brown, Vice Pres., Transmitter Mfg. Co., New York, John E. Smith, Spencer Chemical Co. 6. Mark Withey, Trojan Powder Co. 7. John A. Stark, G.L.F. Bridgeton Jersey Plant.

devoid of protection. These conditions prevail despite the fact that many plants are in or adjacent to cities graded third class.

Private outside protection is largely non-existent or of little value. First aid fire protection which could easily be provided, is generally inadequate.

Except for some notable exceptions, where central station watchman service is provided, there is generally no watchman service worthy of mention.

There is indication that the overall electrical situation may be fairly good, but there is appreciable use of open-type electrical devices and wiring.

Heating, which is frequently provided only in offices and locker room, is furnished by a variety of devices, such as oil and coal stoves, portable oil forced air, steam, hot water and electric.

Care and cleanliness generally is not quite good.

Such departments from recommended standards create problems vitally affecting company finances and operation since major factors in both cost and operation are insurance safety. The unsafe plant will justifiably cause high, perhaps prohibitive, insurance rates. The plant may be rejected as an insurable risk, or be such a poor risk as to preclude an insurance company's writing but a very small portion of the total value. Complete coverage would be impossible, or accomplished only with difficulty in seeking insurance markets. In addition, substandard properties are less efficient in operation and maintenance, and because of the unfavorable impact of poor and unsafe surroundings poorer personnel attitudes further lower the over-all plant efficiency.

It is evident, therefore, that construction, arrangement and protection deficiencies indicate the remedial measures necessary through proper planning and design of structures, equipment and protection.

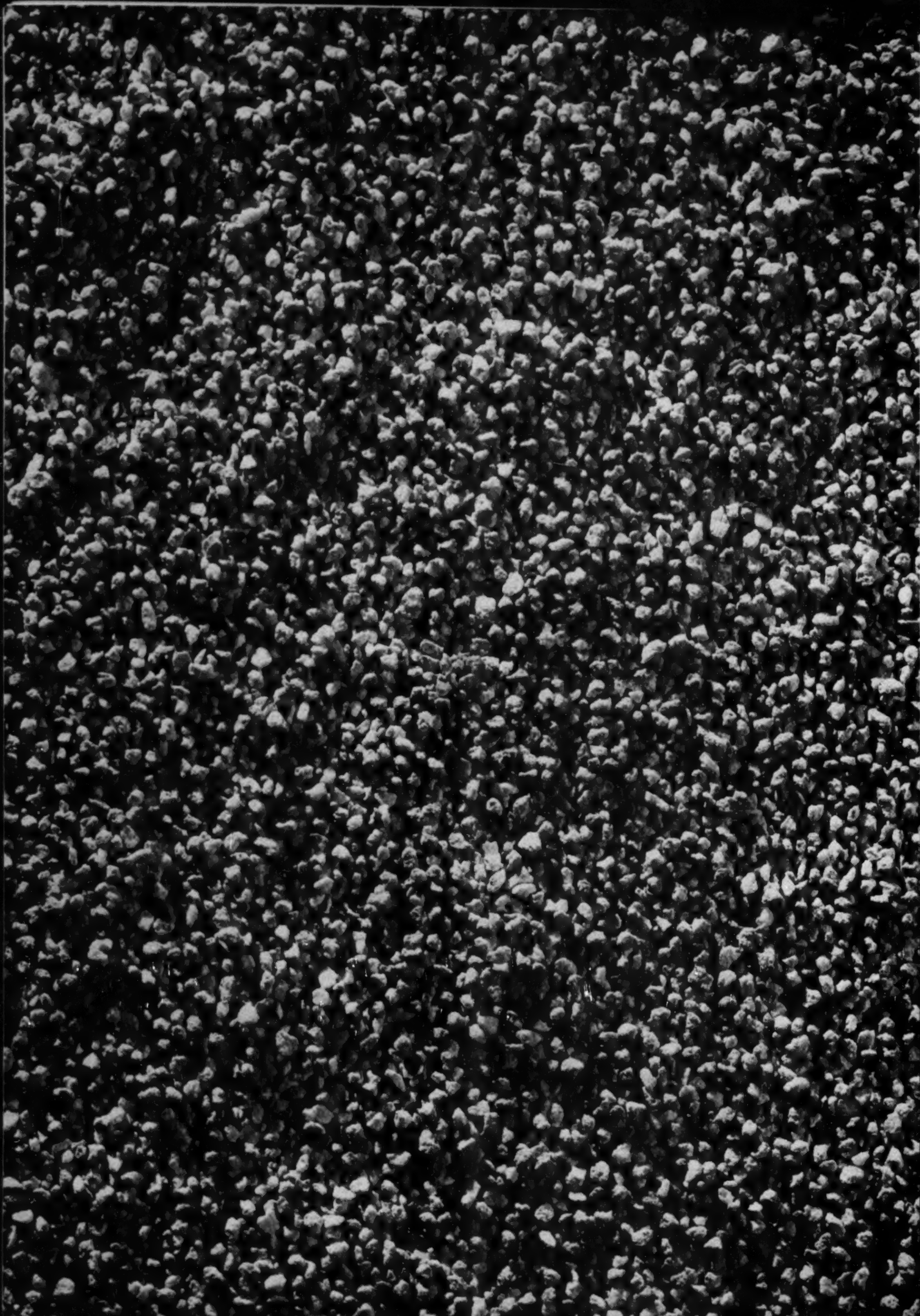
Fire safe construction requires that valuable areas with combustible occupancies be of fire-resistive construction such as reinforced concrete or protected steel, with masonry walls, floors and roofs. For important occupancies that are not combustible, construction should be of a type that will not burn such as all steel, corrugated asbestos cement board on steel frame, and equivalent types. Where wood construction must be used, heavy plank on timber or plank on steel should be chosen, with floor and roof framing planned to permit economical installation of automatic sprinklers.

"Fire-resistive" is defined as construction which will not contribute combustible material to the fire, and in addition will withstand any expected fire without suffering any basic damage of structure. Bare steel does not qualify hereunder. "Incombustible" (or non-combustible) materials, such as all-steel or corrugated asbestos-cement board on steel frame and similar variations, are satisfactory for contents which will not burn or which contain only a minimum portion of combustible material. The use of various wall boards, sound-deadening or insulating material of cellulose composition should also be recognized as adding combustible material and destroying the incombustible classification.

Processes or process and storage areas should be subdivided as much as possible, to keep building areas as small as practical in order to limit the amount of damage possible by a single fire. This should be done preferably by having separate buildings well spaced from each other with clear space requirements varying, depending upon the type of facing walls, the size of the building, the nature of the occupancy and perhaps the type of protection available. In the absence of specific details or standard requirements it would probably be advisable to suggest a fifty foot separation between all major components or hazardous occupancies.

Where space limitations prevail, effective isolation or subdivision may be secured by a judicious use of fire walls with automatic fire doors and shutters at necessary

(Continued on page 64)



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SOUTHEASTERN REGIONAL ACS MEETING AT AUBURN

Duncan Hall at Alabama Polytechnic Institute, October 23-24 was the scene of a busy two-day meeting of American Chemical Society members from the South, who held a Soil Chemistry and Fertilizer symposium, at the Auburn, Alabama institution.

The program was a full one and studded with outstanding names in the field of agronomy, who presented a series of excellent and valuable papers on the subject.

In addition to the more serious matters, Friday evening's barbecue supplied a social meeting ground for the members and their wives, who were also entertained at a tea and a luncheon at the Sangahatchee Country Club.

Thursday morning's program led off with a major address by David T. Mowry of Monsanto's central research laboratories, on the subject of Krilium. This occupied the morning. The subject of Krilium was resumed after lunch when John I. Wear, of Auburn and Vernon C. Jamison, USDA spoke on the effect of Krilium compaction and puddling on the water storage capacity and porosity of Lloyd clay.

The nature of clay the fraction of some Florida soils was next discussed by J. G. A. Fiskel of the University of Florida a paper jointly prepared by Dr. Fiskel and S. B. McCaleb, of the North Carolina AES.

A session on fertilizers followed. F. T. Nielson presented material prepared jointly with L. D. Yates, also of TVA, and discussed the making of compound fertilizers from rock phosphate, nitric acid, ammonia and potassium or ammonium sulphate. The agronomic value of nitric phosphates and problems in fertilizer evaluation were handled by Howard T. O. Rogers, of Auburn and F. T. Nielson.

Friday morning, James A. Naftel, Pacific Coast Borax, presided over a session on advances in fertilizer technology. The first speaker was John R. Taylor, Jr. APFC on Trends and Critical Status of fertilizers. He was followed by George V. Taylor, Spencer Chemical on Nitrogen. Vincen Sachelli, Davidson Chemical discussed phosphorus. Potassium was handled by J. Fielding Reed, American Potash Institute. R. P. Thomas, I.M.C. discussed secondary and minor elements. Trends in fertilizer economies were covered by Arthur M. Smith, Mathieson Chemical.

After a general discussion and summary sessions, many of the delegates went on an inspection trip to the soil chemical laboratories and USA tillage laboratories—with F. L. Davies and V. C. Jamison in charge.

TRENDS AND CRITICAL STATUS OF FERTILIZERS

By Dr. John R. Taylor, Jr. Agronomist
American Plant Food Council, Washington, D. C.

This meeting here today to discuss advances in chemical fertilizers is most timely because future historians will probably record the 1950-60 decade as a revolutionary period in the history, development and use of fertilizers.

Major developments are taking place which affect not only fertilizer manufacturers and farmers but the public at large. The adequate use of the right kind of fertilizer means—in simple terms—an abundant supply of food and fiber at lower cost of production. The public is becoming increasingly aware of the significance of this statement because although we live in a land of plenty, we know the tragic results of starvation in other part of the world.

What then are the trends and status of fertilizers?

First, our population is increasing at a rapid rate. About 2½ million more people each year, or a total of over 190 million by 1975 according to the Bureau of the Census. This means an ever increasing demand for food and fiber crops if we expect to maintain or improve our diets. We could, of course, eat more cereal crops and less meat, and feed a larger population, but this is not the American way of life.

In the past, when we needed more production, the common practice was to move west and bring new land into cultivation. Today, there are no new large frontiers and our increased food and fiber production must come from a relatively stable acreage.

Let's review what has happened to our land acreage and focus attention on the future. According to Dr. B. T. Shaw, Administrator, Agricultural Research Administration, U. S. Department of Agriculture, most of the new land areas had been put to use by 1920. Since then, farm mechanization has forged to the front and many acres of cropland formerly devoted to feed production for horses and mules have been released for other purposes. Also, there was some land clearing and irrigation. In total, about 38 million acres of cropland were added between 1935 and 1950. This is cropland equivalent because it includes grazing and pasture land in addition to cultivated land.

During this same period, putting science to work on the farm added an equivalent in food and fiber products equal to about 64 million acres of land.

Presented at the Southeastern Regional Meeting of the American Chemical Society, Auburn, Alabama, October 24, 1952

1. Friday speakers and presiding officers: Dr. Fielding Reed, American Potash Institute, Atlanta, Arthur M. Smith, Mathieson Chemical Corp., Baltimore, James A. Naftel, Pacific Coast Borax Company, Auburn, R. P. Thomas, International Minerals & Chemical Corp., Chicago, Vincent Sauchelli, Davison Chemical Corp., Baltimore, George V. Taylor, Spencer Chemical Co., Kansas City, James R. Taylor, American Plant Food Council, Washington. 2. Howard T. Rogers, Head Agronomy and Soils Dept., Alabama Polytechnic Institute, Auburn, F. T. Nielsson, Development Branch, Division, Chemical Division, TVA, J. G. A. Fiskel, Asst. Biochemist, University of Florida, Vernon C. Jamison, USDA, Auburn. 3. J. D. Capps, Gen. Chairman, Southeastern Regional meeting American Chemical Society, John I. Ware, Agronomy and Soils Dept., Alabama Polytechnic Institute, who presided at Thursday's session.

Thus, 38 million acres released from feeding work animals and the equivalent of 64 million acres added by scientific developments gives a total of 102 million acres from 1935 to 1950. This was enough increase to enable us to feed and clothe a growing population in a war era.

But what about the future with the poulation increasing at the rate of 2½ million annually. Can we continue to add more acres to meet the growing demand?

It has been estimated by the U. S. Department of Agriculture that the food and feed equivalent of 115 million additional acres will be needed by 1975. There are still some horses and mules to be replaced by tractors but this will release only 15 million acres by 1975. Irrigation, land clearing and flood control programs are estimated to add another 30 million acres. So, this gives 45 million additional acres by 1975 but we need the equivalent production from 115 million acres. If this estimate is true, then there will be a shortage of about 70 million acres by 1975.

The situation may not be quite this gloomy because there are millions of acres that could be reclaimed—at a price—a high price in some areas. Under present conditions, it may not be economically feasible to grow crops on large areas of this marginal land. At any rate, one thing is clear, there are no easy, fertile acres left to be put into cultivation.

There is another trend which also should be considered. In 1910, 35 percent of the people lived on farms. Each farm worker produced enough to feed 8 people. Today, less than 15 percent of the people live on farms and each farm worker on the farm produces enough for 15 people.

Agricultural workers constituted 38 percent of the total labor force in 1900, 27 percent in 1920, 17 percent in 1940, and about 12 percent last year. We have lost about one million farmers since 1940.

Along with this decrease in farm labor has come an increase in the size of farms. The average farm increased from 174 acres in 1940 to 215 acres in 1950, a record high.

Thus with **fewer farmers** but with **larger farms** the production of each farmer becomes more important. In the future, each farmer will have to produce more than ever before—not just to feed and clothe a growing population but to increase his own standard of living as well. This does not mean that farmers will necessarily have to work harder but our agriculture is changing and scientific improvements must be put to work on the farm.

There exists along with the other trends, another important factor. Never before in history has there been such enthusiasm and desire to save and rebuild our soils—not only for high production this year, but for years to come so that the land will be left in better shape for future generations.

So we find ourselves looking into the future with a relatively fixed crop acreage, which must produce adequate food, feed and fiber for a rapidly increasing population. Furthermore, there will be fewer farmers to do the job. But the fertility of our soils must be maintained and improved if this nation is to continue to be the best fed and best clothed nation in the world.

Can we meet the challenge? What can be done?

The answer isn't simple because farming today is more than just a way of life. Farming is a business and better management practices will be essential in the future.

Successful farming entails bringing together a host of controllable factors and adapting them so that they will work on a particular farm. Then, there is one factor over which the farmer has little, if any control, and that is the weather.

In this highly scientific and technological age, research and education is bringing forth so many new developments that successful farmers take the time to study and put these into practice. New and better varieties of crops, better controls for insects, weeds and diseases, new and better farm equipment, proper land use, and many others. All of these will play an important role in meeting the challenge for greater production in the future.

But these benefits will not be enough. Fortunately, there is an answer to the problem—an outstanding and indisputable answer.

The key to increased agricultural production and better living for the present and for the future is chemical fertilizers. The adequate and proper use of fertilizers will not only enable us to meet future food, feed and fiber goals but will make it possible to maintain and improve our soils. Without adequate plant food, other improvements would be of little value.

Never before in history has so much dependence been placed in chemical fertilizers. According to the U. S. Department of Agriculture, only 14.5 percent of the total crop production was due to fertilizers in 1938 but this increased to 25 percent in 1951. Over one-fourth of our total production is directly due to the use of fertilizers. This proportion will increase in the future.

Here in the South, the need for chemical fertilizers has long been

(Continued on page 69)

FLORIDA

U. S. Phosphoric division of **Tennessee Corporation** has had its plans approved by DPA for the expansion of its phosphatic fertilizer production at Tampa. Most of the money will be spent for equipment, plus some buildings.

* * *

Naco's new mixing plant at Fort Pierce should be under actual construction shortly, according to O. C. Minton, vice-president. Steel delayed construction after foundations had been poured several months ago. The plant replaces the one destroyed by fire a year ago. The new plant, to cost $650,000 was designed and will be equipped by **A. J. Sackett.**

ILLINOIS

Consolidated Feldspar Corporation has agreed to sell its assets to IM&C, and will be dissolved. Subject to the approval of stockholders, the transfer will take place November 28. The stockholders are offered one share of IM&C for each two and one half of Consolidated.

* * *

Illinois Farm Supply Company, Chicago, has developed a new free-flowing and uniform-analysis fertilizer. This product was developed at their East St. Louis laboratory by **James E. Seymour,** their research chemist. The fundamental of the development is Santomerse No. 1, an all-purpose wetting agent of the anionic type, manufactured by **Monsanto.** The new product has been named Gro-Flo and has been field tested on hundreds of Illinois farms over the past year. Illinois Farm Supply is an affiliate of the **Illinois Agricultural Association** which has a membership of more than 191,000 farmers.

KANSAS

Blue Valley Fertilizer Company, Marysville, examined a site and in 70 days was in operation with a plant producing 100 tons of fertilizer per shift—and operating three shifts, with 25 men. An excellent modern plant layout carries the product from unloading through the plant and returns it for storage via overhead conveyor to storage bins. **Ralph Huffman** is salesmanager.

LOUISIANA

Kelly-Webber Company, Lake Charles, in August installed a six-bin **Davidson-Kennedy** cluster hopper, which the photographs here show. An automatic solution tank, part of the system, permits one-man control though a total of six men are the crew for the entire unit. One directs materials in to the hoppers. One weighs and controls the flow of materials through the mixer by use of air controls. The remaining four are on the Payloaders—two of which supply the hoppers, the other two move mixed goods from the mixer to storage.

This installation has cut the crew from 17 to 6, and production has been increased from twenty-five tons an hour to forty. By use of a single control valve for all three air cylinders, actual mixing time is about one and a quarter minutes out of the complete one and a half minute mixing cycle.

Production Manager, Wm. Gedge Gayle reports Kelly-Weber as well pleased with the new equipment.

Freeport Sulphur's barge-riding plant at Bay Ste. Elaine, has had as widespread publicity as anything we have seen for a long time. Editors are naturally fascinated by the photographs of a full-sized working Frasch plant, built on a floating foundation, towed 65 miles to work a dome by the Freeport process, which permits use of brackish water. We have reported the operation here as it progressed, with mention of the several features which now intrigue editors: the microwave link with headquarters; the shipment of molten sulphur in insulated barges; the floating mine itself—all firsts. The total investment runs up to around $5,000,000.

MARYLAND

Mathieson Chemical Corporation has announced a new plan of organization as a result of the corporation's recent expansion and the merger with **E. R. Squibb & Sons.**

John C. Leppart continues as executive vice president of the corporation. **Shanley de J. Osborne,** financial vice president, will direct the activities of the corporation's financial and auxiliary departments.

Operations, sales and development activities are placed in four major divisions of Mathieson Chemical Corporation to be known as: **Mathieson Development Company, Carl F. Prutton,** president; **Mathieson Industrial Chemicals Company, Donald W. Drummond,** president; **Mathieson Agricultural Chemicals Company, S. L. Nevins,** president; and **E. R. Squibb & Sons, Theodore Wicker, Jr.,** president.

Mr. Nichols will assume the added responsibilities of chief executive officer of the drug and pharmaceutical divisions, comprising the activities formerly carried on by E. R. Squibb & Sons. **Russell Hopkinson,** vice president of Mathieson, will direct and coordinate the activities of this division and will have the title of director of drug and pharmaceutical divisions. Three executive vice presidents of the E. R. Squibb & Sons division have been appointed: **C. M. Van Kirk** for domestic operations; **L. W. Manning** for overseas operations; and **W. A. Feirer** for the

Around the Map

Squibb Institute for Medical Research.

Other officers of Mathieson Chemical Corporation appointed are: **J. V. Joyce**, vice president and comptroller; **E. R. Van Vliet**, vice president and treasurer; **C. S. Gage**, vice president—purchasing; and **A. P. Winsor**, secretary.

The executive officers of Mathieson Chemical Corporation will remain in Baltimore, Md. Headquarters of the Mathieson Agricultural Chemicals Company division will be in Little Rock, Arkansas.

MISSOURI

Consumers Cooperative members will interrupt their annual meeting in Kansas City, December 2-4 to take chartered busses to Lawrence where will be laid the cornerstone of the $15, 000,000 plant they are building.

* * *

Northeast Missouri N H_3 Corporation has been organized at Dameron to build a $60,000 anhydrous ammonia distribution plant. Organizers are **Vernon Moudy** and **Chester Gray**, both of Elsberry, and **Howard Harke** of Old Monroe.

MISSISSIPPI

Mississippi Chemical directors have authorized the actual construction of the new $5,000,000 nitrogen plant at Yazoo City, at a meeting there October 17. **Girdler Construction**, who built the original plant will do the engineering and construction on the expansion project as well.

* * *

Hull Nitrogen Company, Inc., has been chartered at Winona with a capital stock of $65,000.

NEBRASKA

Farm Fertilizers, Inc. is building a 100 by 127 foot concrete storage and shipping building as an addition to its plant near Omaha.

NEW YORK

Pacific Coast Borax Co., Division of Borax Consolidated, Limited have announced that henceforth their operations in the agricultural and related fields would function in two divisions with new names. Research, development, and sales in the field of crop production and plant nutrients will henceforth operate under the **Plant Food Division. E. M. Kitchen** and **Dr. J. A. Naftel** will continue to have charge of the research and sales development programs in this division throughout the United States, with the exception of the eleven Western States.

In line with the broadened scope of its activities, the division operating in the weed control field will henceforth be known as the **Agricultural Sales Division.** In addition to weed control work,, this division will also be responsible for Boron deficiency work in the eleven Western States. **Dr. L. M. Stahler**, who has recently joined the Company, will head up research and development work in this new Agricultural Sales Division.

* * *

H. J. Baker & Bro. have been named exclusive distributor for Montansalpeter Ammonia Sulphate Nitrate, now being received in bulk from Germany. This 26% nitrogen material is being offered the trade in pellet form.

* * *

Co-operative Grange League Federation Exchange, Inc., has announced a new fertilizer plant to be built in Big Flats, authorized by the board of directors.

The announcement was made by **C. N. Silcox**, assistant general manager, at the 32nd annual meeting attended by 3,000 farmers of New York, New Jersey and northern Pennsylvania.

J. C. Crissey, manager of the GLF soil-building division, said the exact location, size, estimated cost and construction date have not yet been determined.

TEXAS

Stanolind Oil and Gas, Slaughter, has in operation the plant unit to recover 48 daily tons of sulphur from hydrogen sulfide. It may soon be shipping the product as a liquid, instead of a solid as at present.

* * *

San Jacinto Chemical is reported to be getting set to increase its anhydrous ammonia capacity by 50%.

VIRGINIA

You may recall a report in this department last month of the lime plant owned by the State, which was operating at a deficit, causing the newspapers locally to question why the State should be in the lime business anyhow. The price of lime at the Appomatox plant has been raised. The price at the Staunton plant will be unchanged. The explanation is that the Appomatox plant is smaller; and costs are higher there. The prices fixed are legally required to just cover the cost of production. The newspaper question remains unanswered.

* * *

Bone Dry Fertilizer offices at Richmond were looted recently and the office safe was, if we may be forgiven, left bone dry.

* * *

Virginia Carolina publishes a well-edited and beautifully illustrat-

(Continued on page 69)


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in multiwall
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*With its 17,000,000 acres of scientifically tree-farmed woodlands—twenty huge pulp, paper and board mills—another twenty converting plants devoted exclusively to products for modern packaging... with these, the International Paper Company and its affiliated companies serve as a vast reservoir of raw materials, facilities and "know-how" for the quality production of Bagpak Multiwall Paper Shipping Bags.
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Mostly Personal

W. H. Taylor has been made manager of the Henderson (Texas) Oil Mill and Fertilizer Plant. His experience as a county agent and vocational agricultural teaching, plus his training at Texas A&M, from which he graduated in 1936, will be helpful in his new work.

* * *

Thomas C. Keeling, Jr.—on leave from the **Koppers Company** — has been made deputy director of the Chemical Division, NPA.

* * *

W. B. Moncur, chairman of the **Indian Jute Mills Association,** is visiting the US to promote closer contact between American burlap consumers and the Indian manufacturers. He is a Scot who has lived in Calcutta for thirty years, and is connected with **Andrew Yule & Co., Ltd.** With him are deputy chairman **G. J. Gardner,** an Englishman, in Calcutta for **Kettlewell Bullen and Co., Ltd.** and vice-chairman **J. G. Walton,** another Scot who is with **Thomas Duff and Co., Ltd.** in Calcutta.

* * *

Gustave A. Nelson has been promoted from works manager at company expansion plans. **James M. McWhirter,** southern works man-Wyandotte to general engineering and consultive in connection with ager has succeeded him. **Herman H. Eichenhofer** has moved up from assistant superintendent at Wyandotte to superintendent at the Calvert City, Kentucky, plant.

* * *

George W. Roper has been made assistant technical director of the dust and fume control division, at **American Wheelabrator & Equipment Corporation.** He has been with them for 6½ years.

* * *

Julian Howard, Howard Fertilizer Co., Orlando, Florida, introduced to the local Rotary Club **Dr. Frank E. Gardner,** USDA horticulturalist, who told the Rotarians that Quick Decline (tristeza) is here to stay and "we will have to learn to live with it." USDA men are in Brazil studying this new citrus grower problem whose rate of infection doubles each year, and which attacks orange trees on sour orange host root stock by shutting off the food supply at the roots.

S. L. Nevins, president of the Mathieson Agricultural Chemicals Company, Mathieson division whose executive offices remain in Little Rock, Arkansas.

R. P. Koos has been elected president-treasurer of **N. S. Koos & Son Company,** Kenosha, Wis., succeeding the late **Edward J. Koos.** He had been secretary-treasurer since 1937. **Grace A. Koos** has been made secretary and a member of the board.

* * *

Ray Brumlow has joined the staff of **Campbell Fertilizer,** Houston, producers of Hou-Actinite. He will counsel with farmers and ranchers in their trade territory.

* * *

George P. Bloxham has been named manager of the Southern Division

All four of these are Spencer Chemical men: 1. Ervin W. Segebrecht, formerly with Armour and Company, who is assistant director of sales development, and manager of the Spencer market research section. 2. S. R. White manager of the new North Central District sales office in Chicago. 3. W. E. Hubbard, manager of the new mid-South sales office in Memphis. 4. John L. Sanders, manager of the Atlanta office since it opened. All have had a great deal of experience in the field, and are well known in the fertilizer industry.

Two men who have served agriculture well, and retired to well earned rest were feted recently at NFA's dinner honoring the Control Officials. They are, left, A. L. Mehring, USDA, and F. S. Lodge, NFA. Fred writes us he is getting ready to follow the birds— a three inch snow fell up there in Pennsylvania where he now lives, and he'll be seeing all of us in Miami Beach.

of **Pacific Guano,** succeeding **Howard G. Conley,** who moves from that post to Assistant General Manager at the Berkeley office. **Weller Noble,** Pacific's president and general manager, made the announcement.

* * *

Richard F. Dunbar has been made advertising manager of **Equitable Paper Bag.** He was formerly admanager of Dixie Cups.

Walter R. Horn has been appointed to head the $3,500,000 plant of the **Missouri Farmers Association** near Joplin, Missouri. Graduating in 1940 as a chemical engineer, he has held several posts of increasing importance, served in the Army, and has been until his appointment by MFA superintendent of the **Swift** superphosphate plant at Bartow, Florida.

BOOKS

USING COMMERCIAL FERTILIZER, by Malcolm H. McVickar, Chief Agronomist for the National Fertilizer Association, published by The Interstate, Danville, Illinois. 208 pages; 106 illustrations. Trade price $3.

Here is a text book of beautiful simplicity. It is not written down to anyone, but neither is it up in the clouds of the higher learning. It belongs on the book-shelf of any plant —but also in any school for Future Farmers, fertilizer salesmen, or agricultural college students. Each chapter has a set of test questions. In a sentence, this book tells what commercial fertilizers are, how they are made, and how they should be used on farms for increasing crop production.

* * *

PHOSPHORIC ACID, PHOSPHATES AND PHOSPHATIC FERTILIZERS, by William H. Waggaman, Senior Mineral Technologist, Bureau of Mines—a completely revised 2d edition, published by Reinhold Publishing Corporation, 330 W. 42 Street, New York 36. 683 pages, illustrated. $15.

The first edition of this thorough work was issued in 1927. The present edition has been brought completely up to date as has been made necessary by advancement in phosphate technology. The text is fully illuminated with pictures, charts and tables. There is even a complete list of US patents pertaining to the manufacture and use of phosphorus compounds.

Well written, clear—it can be read by layman and technical men alike to the benefit of both.

* * *

SUPERPHOSPHATE AND COMPOUND FERTILIZERS, written by a team of British fertilizer men representing both management and labor, who visited plants throughout the United States. Available from the US Department of Commerce, Washington 25, D. C.

This book is worth the reading of fertilizer management because it gives us a chance to "see ourselves as others see us" and thus is an excellent perspective view of our own operations.

* * *

INSECT RESISTANCE IN CROP PLANTS, by Reginald Painter, for 25 years a leader in the study of this subject. Published by The Macmillan Company, 60 Fifth Avenue, New York 11. 520 pages. $9.50.

This book, probably for the first time, puts between covers all that is now known about the varieties of wheat, corn and other major crops whose insect-resistance has been developed and tested, and the conditions under which plants can best be protected against pests.

* * *

INSECTS, the 1952 Yearbook of Agriculture, published by the US Department of Agriculture. 952 pages. Cloth bound. $2.50.

This book, with 131 chapters, is a comprehensive compilation of the insects which do four billion dollars worth of damage annually. 72 full-color plates, photos and drawings supplement the text, which fully covers the subject.

* * *

PROCEEDINGS of the 6th International Grasslands Conference, in 2 columns of 850 pages each will be available at $15 per set. Orders must be accompanied by money orders or checks and must be in the hands of the Treasurer, Finance Committee, Sixth International Grasslands Congress, 1778 Pennsylvania Avenue, N.W., Washington, D. C. by November 30. There will be only one printing. Delivery will be made about December 31, 1952.

* * *

PROCEEDINGS of the American Association of Fertilizer Control Officials 1952 meeting will be available early in January at $1 per copy from Bruce Cloaninger, Sec-Treas. Drawer 392, Clemson, S. C.

In the field of farm PESTICIDES

California Spray Chemical expects that by mid-February their $100,000 plant at Pine Bluff will be turning out farm and livestock insecticides.

• • •

International Minerals & Chemical, Chicago, on October 15 sold the name of **Innis, Speiden & Company, Inc.** and its resale chemical business to **Berkshire Chemicals, Inc., New York.** The insecticide segment went to a group of former employees, who are operating under the name **Larvacide Products.** International thus remains in possession of the chief reason for its original purpose, the electrolytic plant at Niagara Falls, New York. More than a million dollars will be spent there for improvements which will increase chemical and chlorine products output by about 25%.

• • •

O. Harry Blanton has been made Southeastern district sales manager for agricultural chemicals by Pennsalt. He headquarters at Montgomery, Alabama.

• • •

Gordon M. Williams has been made assistant supervisor, agricultural chemicals research section; **Jack Hensel** was named supervisor of analytical research in the research and development department; **William R. Davie** and **Arthur M. Gladstone** were made assistant supervisors of agricultural chemical research by **Pittsburgh Coke & Chemical.**

Powell Insecticide Plant in Atlanta

New insecticide manufacturing facilities have been established in Atlanta, Georgia, according to an announcement by Mr. H. Alvin Smith, President, John Powell & Co., Inc., New York.

The new plant is especially equipped to manufacture DDT, Toxaphene and Benzene Hexachloride concentrates to meet the regional needs for agricultural insecticides.

The Atlanta plant represents the only firm in the Southeast specializing in basic insecticide materials for the independent manufacturer, Mr. Smith stated, and because Atlanta is the hub of rail and truck lines serving the Southeast, swift and even overnight deliveries will be possible to meet sudden insect infestations.

Manufacturers of household and industrial insecticides will also benefit by the new facilities, since special concentrates for such use will be supplied by the Atlanta plant.

Vincent Russo, formerly production manager of Powell's Chemical plant in Huntsville, Alabama, has been made General Manager of the new Atlanta plant.

Vincent Russo, former production manager of their plant at Huntsville, Alabama, who has been put in charge of the new insecticide manufacturing facilities of John Powell & Co. in Atlanta, Georgia.

Plant Chemotherapy Research Report

An assay method for measuring the usefulness of various compounds as chemotherapeutants for controlling plant disease is discussed in a new scientific publication of The Connecticut Agricultural Experiment Station, entitled "Plant Chemotherapy As Evaluated by the Fusarium Wilt Assay on Tomatoes". Its authors are A. E. Dimond, David Davis, R. A. Chapman and E. M. Stoddard.

The bulletin represents the Station's latest research findings in its chemotherapy program, in which the institution pioneered some 12 years ago. At that time, chemotherapy was a brand new approach to plant disease problems. Instead of attacking an infection from the outside, by conventional spray methods, chemotherapy puts protective compounds inside the plant where they can fight disease organisms which grow in the internal tissue. This is usually done by watering the soil in which the plants grow with the compounds. From the soil, the roots carry the chemicals to the inside portions of the plant. By now, chemotherapy has proved its worth on a number of plant diseases and shows promise of controlling several others.

Highly technical in nature, the new publication will be of primary interest to research workers concerned with diseases of plants. It discusses methods of testing compounds for chemotherapeutic effect and weighs the merits of various systems of determining results. It describes how the successs or failure of a compound as a chemotherapeutant may be predicted in advance of testing by studies of its chemical structure. The part plant metabolism plays in effectiveness of chemotherapeutic treatment also receives attention. This is the newest line of research in the field being pursued at the Station.

Scientists and others interested in the new publication may receive a copy by requesting it from The Connecticut Agricultural Experiment Station, P. O. Box 1106, New Haven. Ask for it by number and name, Bulletin 557, "Plant Chemotherapy As Evaluated by the Fusarium Wilt Assay on Tomatoes."

FAO REPORT ON WORLD FERTILIZER STATUS

Concluded from October Issue

The following sections give more detailed information on further production and consumption by continents and countries. (See Tables A to F).

SUMMARY FERTILIZER POSITION BY CONTINENTS

Europe

Changes in the production and consumption of fertilizer in Europe for the period under review are shown in the following table:

Table 9. **Changes in the Production and Consumption of Nitrogen, Phosphoric Acid and Potash for 1950/51, 1951/52 and the Outlook for 1952/53.**

	1950/51	1951/52	1952/53	Percentage Change, 1951/52 over 1950/51	Percentage Change, 1952/53 over 1951/52
	. . . in Metric Tons . . .				
PRODUCTION					
All Fertilizers	8,081	8,435	8,879	+4.4	+5.3
Nitrogen	2,128	2,291	2,440	+7.7	+6.5
Phosphoric Acid	2,656	2,741	2,856	+3.2	+4.2
Potash	3,297	3,403	3,583	+3.2	+5.3
CONSUMPTION					
All Fertilizers	6,977	7,165	7,745	+2.7	+8.1
Nitrogen	1,891	1,926	2,073	+1.8	+7.6
Phosphoric Acid	2,535	2,487	2,686	—1.9	+8.0
Potash	2,551	2,752	2,986	+7.9	+8.5

In line with rising commodity prices, the prices of commercial fertilizer tended to increase in 1951/52 over 1950/51. The limited supply of phosphates on world markets was doubtless an important factor in increasing the world prices of phosphates relatively more in some areas than the prices of nitrogen or potash.

Some European countries used much more potash than phosphoric acid in 1951/52. Seven countries reported a total consumption of 1,037,000 tons P_2O_5 and 1,592,000 tons K_2O. Other countries report the use of more phosphoric acid than potash. Italy, for instance, in 1951/52 used 290,000 tons phosphoric acid (P_2O_5) and 20.000 tons potash (K_2O.) On the other hand, the Federal Republic of Germany used, in the same year, 440,000 tons of phosphoric acid (P_2O_5) and 700,000 tons of potash (K_2O). France used approximately the same amounts of each, phosphoric acid and potash.

TABLE E. **POTASH: Production for Years Ending 30 June 1951, 1952 and 1953.**

Continent and Country	1950/51	1951/52 Preliminary	1952/53 Outlook
	. . . Metric Tons K_2O . . .		
EUROPE			
France	912,000	920,000	990,000
Germany — Fed. Rep.	1,011,765	1,050,000	1,150,000
Soviet Zone	1,200,000*1/	1,250,000*1/	1,250,000*1/
Italy	700	700	700
Netherlands	1,854	1,800	1,800
Spain	170,000*	180,000*	190,000*
United Kingdom	700	800	1,000
Total	3,297,019	3,403,300	3,583,500
NORTH AND CENTRAL AMERICA			
United States	1,188,000	1,243,000	1,465,000
SOUTH AMERICA			
Chile	9,855	10,843	11,000
Peru	6,140	6,500	6,500
Total	15,995	17,343	17,500
World Total	4,501,014	4,663,643	5,066,000

1/* This estimate, based on the best data available, may be considered a little high by some authorities. Possible differences in estimates, however, would not alter the world position indicating that in 1951/52 supplies of potash on world markets were sufficient to meet world demands. (Since compiling the above, indications are that some estimates may be slightly higher.)

SOURCE: Data presented by governments. Unofficial figures are derived from trade and other sources and are subject to confirmation. All data are exclusive of the U.S.S.R.

While accurate consumption data is difficult to obtain, it is estimated that the countries of Eastern Europe use relatively small amounts of phosphoric acid supplied as commercial or chemical fertilizer, although considerable quantities are supplied as farm manures. As some indication of the possible level of phosphate consumption in the form of commercial fertilizers, it is noted that the five phosphate plants and one ironworks in the U.S.S.R. Zone of Germany, with a total indicated capacity of about 36,000 tons P_2O_5, are estimated as producing much less than this, i.e. about 25,000 tons P_2O_5. The balance of the needed phosphate is reported as being made up by imports. The total phosphate supply is considered as supplying roughly 10 Kg P_2O_5 per hectare of agricultural land. in Eastern Germany whereas the real need is much higher. Should the same pattern apply to Eastern Europe, the use of phosphoric acid is relatively quite low. However, if consumption in Eastern Europe is higher than estimated, the basic pattern of the relative amounts of phosphoric acid and

potash, used in Europe would be modified accordingly.

The reasons for variations in potash and phosphate consumption are doubtless founded on both agronomic and economic grounds. The differences in the price of potash and phosphoric acid is quite wide in some countries. In Germany, for instance, the price of potash per unit of K_2O is much less than the price per unit of phosphoric acid (P_2O_5).

Countries which increased production in 1951/52 over 1950/51 will be found listed in Tables A, C and E of the Appendix.

1952/53 Outlook

The outlook in 1952/53 is for an increase in the total fertilizer consumption of 8.1 per cent which is in contrast to an increase of 2.7 per cent in 1951/52 over 1950/51. Important factors in implementing this higher rate of increase will no doubt be the price level of fertilizer and the prices of agricultural products. Countries which expect to increase the production of fertilizer in 1952/53 over 1951/52 will be found listed in Tables A, C and E of the Appendix, and countries with an expected increase in consumption are listed in Tables B. D and F of the Appendix.

North and Central America

The chief developments in North and Central America in 1951/52 over 1950/51 were a decline in the production of phosphoric acid in the United States in contrast to an increase in the production of nitrogen and potash. There was also a slight decline in the consumption of phosphoric acid in contrast to increases in the consumption of nitrogen and potash.

There was also a slight decline in the consumption of phosphoric acid in contrast to increase in the consumption of nitrogen and potash.

In Canada, the total production and consumption of fertilizer in 1951/52 was about the same as in 1950/51. There were, however, regional variations from this pattern, such as some decreases in the consumption of tobacco fertilizer and some increases in the use of potato fertilizer.

These changes in total fertilizer production and consumption are

TABLE F. **POTASH: Consumption for Years Ending 30 June 1951, 1952 and 1953.**

Continent and Country	1950/51	1951/52 Preliminary	1952/53 Outlook
	. . . . Metric Tons K_2O . . .		
EUROPE			
Austria	25,028	34,000	34,000
Belgium	98,000	115,000	120,000*
Denmark	103,000	135,000	140,000
Finland	31,177	38,000	40,000
France	390,200	420,000	500,000
Germany — Fed. Rep.	659,044	700,000	750,000
Soviet Zone	400,000*	450,000*	475,000*
Greece	10,000	10,400	11,400
Iceland	1,000	1,040	1,140
Ireland	21,354	16,320	16,320
Italy	19,000	20,000	20,000
Luxembourg	3,862	4,000	4,000
Netherlands	155,000	158,000	160,000
Norway	41,320	44,000	45,000
Portugal and DOT	5,000	6,000	6,000
Spain	35,000*	55,000*	60,000*
Sweden	54,443	56,000	58,000
Switzerland	13,000	14,000	15,000
United Kingdom	230,000	165,000	200,000
Yugoslavia	4,500	9,983	20,000
Eastern Europe including Bulgaria, Poland, Czechoslovakia, Hungary and Roumania	250,000*	300,000*	310,000*
Total	2,550,628	2,751,743	2,985,860
NORTH AND CENTRAL AMERICA			
Barrados	2,200	2,250	2,250
Canada	56,811	56,811	61,000*
Cuba	16,214	18,128	20,000*
Dominican Republic	480	480	500*
El Salvador	250*	250*	300*
Guatemala	500*	550*	550*
Honduras	5	6	6
Jamaica	995	1,617	2,318
Mexico	1,692	2,000*	2,500*
St. Lucia	81	90	12
Trinidad and Tobago	491	594	588
Other C. Am. Reps.	1,600*	1,700*	1,800*
United States	1,311,000	1,374,000	1,592,000
Total	1,392,319	1,458,476	1,683,940
SOUTH AMERICA			
Argentina	1,600*	1,600*	1,600*
Bolivia	20*	20*	20*
Brazil	12,000*	14,000*	16,000*
British Guiana	16	16*	16*
Chile	1,843	1,800	1,900*
Colombia	3,000*	4,500*	4,500*
Ecuador	10	20	20*
Peru	6,210	6,510	6,810*
Surinam	10	20	40
Total	24,709	28,486	30,906
ASIA			
Burma		20	30*
Cambodia	12	12	12*
Ceylon	11,275	12,500	13,500
Cyprus	32	50*	75*
Indonesia	2,200*	2,500*	2,700*
Iraq	20	15	15*
Israel	1,000	1,200*	1,500*
Japan and Ryukus	92,892	116,500	120,000
Korea, South	2,000	3,000	4,155
Lebanon	1,400*	1,500*	1,600*
Malaya	2,264	2,400	2,600*
New Guinea	1	1	1*
North Borneo	75	63	65
Philippines	300	2,200	2,200

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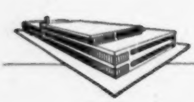

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PAPER MILLS AND SOUTHERN BAG PLANT: ORANGE, TEXAS

(TABLE F Continued)

Syria	175	56	56*
Taiwan	4,437	15,963	20,247
Thailand	120	180	250
Turkey	65	1,040	2,600
Viet-Nam	665	800	860
Total	118,933	160,000	172,466
AFRICA			
Egypt	280	400	400
French North Africa	25,000*	25,000*	25,000*
Liberia	8	6	9
Mauritius	3,616	3,125	3,125
Nyasaland	100	120	140*
Northern Rhodesia	370	400	400
Tanganyika	900	900	900*
Tunisia	500	750	800*
Union of South Africa	7,500	9,000	10,000
Zanzibar	2	3	3*
Total	38,276	39,704	40,777
OCEANIA			
Australia	7,646	8,400	8,820
New Zealand	7,400	14,100	17,200
Total	15,046	22,500	26,020
WORLD TOTAL	4,139,911	4,460,909	4,939,969

SOURCE: Data presented by governments. Unofficial figures are derived from trade and other sources and are subject to confirmation. All data are exclusive of the U.S.S.R.

NOTE: Since this report was prepared, a completed questionnaire has been received from Switzerland which gives the following figures:

	Production	Consumption
Nitrogen	10,500 tons	8,500 tons
Phosphoric Acid	1,700 tons	34,000 tons
Potash	....	14,000 tons

Table 10. Changes in the Production and Consumption of Fertilizer, N, P_2O_5 and K_2O, 1951/52 over 1950/51.

	1950/51	1951/52	Percentage Change, 1951/52 over 1950/51
	. . . in Metric Tons . . .		
PRODUCTION			
All Fertilizers	5,526	4,675	+3.3
Nitrogen	1,158	1,263	+9.1
Phosphoric Acid	2,180	2,169	—0.5
Potash	1,188	1,243	+4.6
CONSUMPTION			
All Fertilizers	4,798	4,986	+3.9
Nitrogen	1,244	1,362	+9.5
Phosphoric Acid	2,162	2,166	—0.2
Potash	1,392	1,458	+4.7

Table 11. Planned Increase in Fertilizer Production in the United States From the 1951 Crop Year to the 1955 Crop Year.

Type of Fertilizer	1951 Crop Year	1955 Crop Year	Percentage Increase
	. . . 1,000 Tons . . .		
Nitrogen	1,285	2,185	70
Phosphoric Acid	2,235	3,485	55
Potash	1,445	2,185	51

shown in the following table which was compiled from figures provided by the completed fertilizer questionnaires.

1952/53 Outlook
Production:

The United States plans[1] to increase fertilizer production for the period from the 1951 crop year to the 1955 crop year by the following tonnages:

The reasons for these proposed increases in production are given in the Secretary's memorandum dated 22 April 1952:

"The primary job facing farmers in the coming years is to increase production of agricultural commodities very substantially and simultaneously to build up the productive capacity of our soil. This is necessary to meet the needs of our increasing population and to keep our country strong. Increased use of fertilizers in conjunction with other desirable agricultural practices is essential in accomplishing this job."

Canada plans to produce substantially larger tonnages of ammonium phosphates in 1952/53. The total increase in fertilizer production may be about 10,000 tons Nitrogen (N) and 50,000 tons phosphoric acid (P_2O_5).

Combining the projected increases in production, the outlook for 1952/53 over 1951/52 in North and Central America is for an increase in the production of nitrogen of 9.1 per cent, phosphoric acid 10.5 per cent and potash 17.9 per cent.

Consumption:

The outlook in the U.S.A. is for a total possible increase in fertilizer consumption — Nitrogen (N) phosphoric acid (P_2O_5) and potash (K_2O) —or some 495,000 tons in 1952/53 over 1951/52. It is anticipated that all three nutrients will contribute to this increase.

In Canada, no outlook estimate for consumption in 1952/53 is available. It is possible that, in view of the increase in the supply of ammonium phosphates and some current shortage of the 11.48 grade in western Canada, consumption, es-

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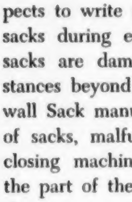

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Hudson Representative, Harry Rafferty (center), points out the packing and closing operations covered by Hudson's new guarantee, to J. Dummett (left), Plant Supt. for Wedron Silica Company.

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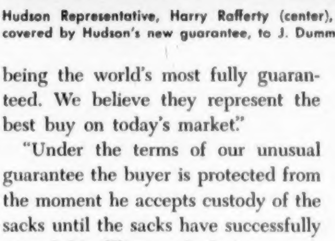

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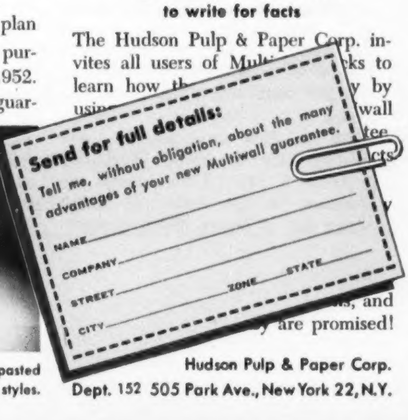

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Table 12. **Changes in the Production and Consumption of Nitrogen, Phosphoric Acid and Potash for 1950/51, 1951/52 and the Outlook for 1952/53.**

	1950/51	1951/52	1952/53	Percentage Change, 1951/52 over 1950/51	Percentage Change, 1952/53 over 1951/52
		. . . in Metric Tons . . .			
PRODUCTION					
All Fertilizers	137	177	185	+ 29.2	+ 4.5
Nitrogn	......	28	31	......	+10.7
Phosphoric Acid	137	149	154	+ 8.8	+ 3.4
Potash	......	......	......	......	......
CONSUMPTION					
All Fertilizers	256	353	376	+ 37.9	+ 6.5
Nitrogen	74	166	181	+124.3	+ 9.0
Phosphoric Acid	144	147	154	+ 2.1	+ 4.8
Potash	38	40	41	+ 5.3	+ 2.5

Table 13. **Production and Consumption of Fertilizer in Asia, 1950/51, 1951/52 and 1952/53.**

	1950/51	1951/52	1952/53	Percentage Change, 1951/52 over 1950/51	Percentage Change, 1952/53 over 1951/52
	. . . in Metric Tons . . .				
PRODUCTION					
All Fertilizers	688	830	932	+20.6	+12.3
Nitrogen	430	510	570	+18.6	+11.8
Phosphoric Acid	258	320	362	+24.0	+13.1
Potash	......	......	......	......	......
CONSUMPTION					
All Fertilizers	1,043	1,225	1,389	+17.4	+13.4
Nitrogen	629	720	818	+14.5	+13.6
Phosphoric Acid	295	345	399	+16.9	+15.7
Potash	119	160	172	+34.5	+ 7.5

pecially in the prairie provinces, may increase in 1952/53 as it has done over a period of years. However, agricultural prices, the possibility or non-possibility of export markets for agricultural products, the prices of raw materials and other factors doubtless will have a strong bearing on actual changes in consumption in 1952/53 over 1951/52, making it difficult to predict the outcome for Canada as a whole.

On the basis of an increase in consumption of 495,000 tons in the United States, some increases in Central America and the same consumption rate in Canada in 1952/53 as in 1951/52, the overall increase for North and Central America in 1952/53 over 1951/52 is estimated at 10.6 per cent.

Africa

For the first time, nitrogen was produced for commercial fertilizers in Africa in 1951/52. Phosphates are produced in the Union of South Africa and in Kenya. While ammonium nitrate is manufactured in the Union of South Africa for industrial purposes, none of it is reported as being available for fertilizers. The most serious raw material problem is to maintain an adequate supply of elemental sulphur for the manufacture of sulphuric acid in the production of superphosphate. Some pyrites are used as a source of sulphur, but the supply is not enough for the needed superphosphate production. Sulphur is in short supply.

Changes in production and consumption for the years noted are given in table 12.

On a percentage basis, the largest increase in nitrogen consumption for any continent in 1951/52 occurred in Agfrica (124.3 per cent). The output of superphosphate in the Union of South Africa contains 20 per cent rock phosphate. A small tonnage of P_2O_5 was exported in 1951/52 to supply other countries in Africa, but it is expected that such exports will be reduced in 1952/53.

An interesting recent development is the production of "soda phosphate" (18 per cent citrate soluble P_2O_5) in Kenya for which plant capacities are being doubled this year.

1952/53 Outlook

The outlook is for an increase in the production of nitrogen and for a small ocverall increase in the production of phosphoric acid in 1952/53. This, however, is all in the form of "soda phosphate" in Kenya. No increase in the production of phosphate is anticipated in the Union of South Africa.

The outlook is for an increase in consumption. Fertilizer are being used in steadily increasing quantities in a larger number of countries in Africa.

Asia

The chief development in Asia was the substantial increase in the production of nitrogen (18.6 per cent) and phosphoric acid (24.0 per cent) in 1951/52 over 1950/51. See table 13.

Production

Nitrogen: Japan produced 42,000 tons of additional nitrogen in the form of ammonium nitrate, ammonium sulfate, urea, ammonium chloride and ammonium phosphate. India's increase from 8,417 tons in 1950/51 to 37,998 tons of nitrogen in 1951/52 is chiefly the contribution of the new sulfate of ammonia plant at Sindri. The increase in Tiawan (Formosa) of 7,000 tons of nitrogen was in the form of cyanamid and ammonium sulfate. A new but significant production was 1,800 tons of calcium nitrate in South Korea.

Phosphoric Acid: Japan increased the production of phosphoric acid in 1951/52 over 1950/51 by 53,000 tons P_2O_5 in the form of superphosphate and fused phosphate. The production of basic slag declined slightly, Taiwan (Formosa) increased production by 3,600 tons P_2O_5 as superphosphate and the new production of serpentine fused phosphate. Significant increases occurred in Israel, and a new production was begun in South Korea. On the other hand, due to a shortage of sulphur, the production of superphosphate declined in In-

Table 14. Production and Consumption of Fertilizer in 1950/51; Estimates for 1951/52 and the Outlook for 1952/53.

	1950/51	1951/52	1952/53	Percentage Change, 1951/52 over 1950/51	Percentage Change, 1952/53 over 1951/52
		. . . in Metric Tons . . .			
PRODUCTION					
All Fertilizers	490	516	457	+ 5.3	—11.4
Nitrogen	13	14	13	+ 7.7	— 7.1
Phosphoric Acid	477	502	444	+ 5.2	—11.6
Potash	......	......	......	......	......
CONSUMPTION					
All Fertilizers	525	554	501	+ 5.5	— 9.6
Nitrogen	20	19	21	— 5.0	+10.5
Phosphoric Acid	490	512	454	+ 4.5	—11.3
Potash	15	23	26	+53.3	+13.0

dia. The 12 superphosphate plants there depend entirely on imported elemental sulphur.

Consumption

The consumption of all fertilizers in Asia increased in 1951/52 over 1950/51 by 17.4 per cent.

Japan reported the consumption of nitrogen as 442,000 tons for each of the three years under review. Substantial tonnages are available for export in 1952/53. Increases in the consumption of nitrogen in 1951/52 over 1950/51 occurred in India, Ceylon, Malaya, the Philippines, Taiwan and Thailand.

The consumption of phosphoric acid increased in Ceylon, Cyprus, Japan, South Korea, the Philippines, Taiwan, Thailand and Viet-Nam and declined in India. The consumption of potash particularly increased in Taiwan and Japan. Increases were also noted in Ceylon, South Korea, Malaya, the Philippines and Viet-Nam.

1952/53 Outlook

The outlook is for a continued upward trend in the production of nitrogen and phosphoric acid, although at a slightly slower rate (13.1 per cent), and for a continued increase in consumption of 15.7 per cent.

The largest agricultural increase in 1952/53 is in the consumption of phosphoric acid followed by nitrogen and potash. Asia, however, was the last agricultural region to recover its prewar levels in the production and consumption of phosphoric acid. Thus, any current increase may still not bring the relative level up to that of many other agricultural areas. Despite increased production in Asia, the outlook is for imports of a volume equal to 1951/52. In addition to Japan, both the production and consumption of fertilizers is increasing in a number of other countries in Asia, particularly in India, Taiwan, South Korea and others. Reports indicate that fertilizers may also be produced in Pakistan and Ceylon at some future date.

Oceania

The prospective decline in the production and consumption of phosphoric acid of 11.3 per cent in 1952/53 over 1951/52 is the most important development in Oceania. An adequate supply of phosphoric acid is vitally necessary in the agriculture of both Australia and New Zealan. Current changes are noted in table 14.

1952/53 Outlook

While both nitrogen and potash are essential under certain conditions (nitrogen, for example, in tropical agriculture), the satisfactory production of wheat, for instance, in many states of Australia demands ample supplies of superphosphate. In some parts of Australia, wheat acreages are reported to have recently declined. This is in part due to the necessary rationing of superphosphate in the three principal agricultural states of New South Wales, South Australia and Western Australia. One result of rationing is reported to be that less acres are sown to wheat and more superphosphate is applied per acre.

It is also noted that the use of superphosphate, together with secondary elements where needed, will convert large tracts of land, at present carrying one sheep to five acres, to land capable of carrying two breeding ewes per acre.

The maintenance of present pastures in New Zealand chiefly depends on adequate supplies of superphosphate. A large expanse of some 9,000,000 hectares of occupied but unimproved hill country is capable of being improved, provided phosphates are available.

The manufacture of phosphate fertilizers in Oceania is currently chiefly dependent upon elemental sulphur or brimstone. Due, however, to a world shortage of this type of sulphur, the supply in Oceania is insufficient to meet the demand for the manufacture of sulphuric acid. The supply of superphosphate is therefore insufficient to meet the increasing demand.

In Australia, the present policy is to change over some of the acid plants now burning elemental sulphur to plants that can burn pyrites as a source of sulphur. Ample supplies of indigenous pyrites are available at three major sources: Western Australia; Mount Morgan in central coastal Queensland, the major source of potential supply; and the main deposit in South Australia. In Tasmania, Mount Lyell is delivering pyrites to the mainland.

The main difficulty is that each source is situated at a great distance from the main points of utilization, and each presents difficult handling, transport, harbor, labor and shipping difficulties. The plans are to develop these resources and thus decrease the dependence on imported elemental sulphur.

The Government has set up a two-year target for conversion. Plants in four states are now working at full capacity on indigenous materials. Four plants in Australia manufacture sulphate of ammonia. Sulphur is also required for these plants.

In New Zealand, work has begun on the production of fused phosphate, and some tonnage has been produced. In the meantime, all su-

Table 15. Changes in Fertilizer Production and Consumption in 1950/51 and 1951/52 and the Outlook for 1952/53.

	1950/51	1951/52	1952/53	Percentage Change, 1951/52 over 1950/51	Percentage Change, 1952/53 over 1951/52
PRODUCTION					
	. . . in Metric Tons . . .				
All Fertilizers	360	355	356	− 1.4	+ 0.3
Nitrogen	282	274	274	− 2.8	....
Phosphoric Acid	62	64	64	+ 3.2	....
Potash	16	17	18	+ 6.3	+ 5.9
CONSUMPTION					
All Fertilizers	179	189	194	+ 5.6	+ 2.6
Nitrogen	71	75	77	+ 5.6	+ 2.7
Phosphoric Acid	83	86	86	+ 3.6	....
Potash	25	28	31	+12.0	+10.7

perphosphate is diluted with rock phosphate and serpentine. New Zealand is supplementing indigenous production by imports.

The immediate problem in Oceania is the maintenance of an adequate supply of superphosphate and sulphate of ammonia until new sources of sulphur can be fully developed.

South America

South America chiefly produces nitrogen in the form of sodium nitrate in Chile. Some ammonium sulphate is also produced, but it is used largely for industrial purposes. Smaller tonnages of chemical phosphates are produced in a number of countries. Potash is produced in Chile only.

Because of the large production of sodium nitrate, South America is a net exporting region for fertilizers.

Due to the byproducts of animal industries available and the successful conservation of guano by several countries, a large proportion of plant nutrients used for fertilizers are deriver from organic sources. The production and consumption of chemical fertilizers, especially phosphates, is growing in importance in many of the South American countries.

In the absence of more complete data from all the South American countries, it has been necessary in compiling the tables to make estimates in several cases from the best sources available.
See table 15.

Once the need for nitrogen is satisfied, the primary fertilizer supply problem in Latin American countries is an adequate supply of phosphates. In many countries the need is urgent. In recent years much has been done to improve indigenous production. Because conditions vary from one country to another, no one statement can be made regarding phosphate production in Latin America. These brief notes indicate the current status in each country producing phosphates.

Chemical phosphate fertilizers are produced in Argentina, Brazil, Chile, Colombia, Cuba, Mexico and Uruguay. Mexico is the largest producer. The chief plant is located at San Luis Potosi. Phosphate rock is imported. An ample supply of sulphuric acid is available from a nearby smelting plant. The production capacity for superphosphate has recently been increased.

Twenty-per cent superphosphate is produced in Colombia at one plant in Medellin. An ample supply is available for use with imported phosphate rock. Currently, production capacity is being increased and Colombia is producing all the sulphuric acid needed in industry. Cuba produces superphosphate and ammoniated phosphate from imported phosphate rock and imported sulphuric acid.

Brazil is also a large producer, having increased plant capacity by building new plants in recent years. Brazil, however, depends on imported sulphur, hence current phosphate production is limited by the supply available. Much of the needed phosphate rock is imported. There is also an indigenous rock production from the mine of Jacupiranga. The average analysis of the ore as mined, which contains iron and aluminia, is 19 to 20 per cent P_2O_5. The iron is removed by magnetic separation, and the average analysis of P_2O_5 is increased to 39 per cent.

In Argentina a new plant has been built with a capacity of 60,000 tons superphosphate, a part of which is to be used until the demand increases. The acid is obtained from a zinc roasting plant, thus there is no problem of sulphur supply. Uruguay has three phosphate plants which all depend on both imported sulphur and phosphate rock. Currently, production is limited to the amount of sulphuric acid that can be supplied. As already noted, Chile produces two types of Rhenania phosphate which do not require sulphur in their manufacture.

The chemical phosphate industry in Latin America depends almost entirely on imported phosphate rock and in some countries on imported sulphur. Urgent needs in Latin America are indigenous sources of high grade phosphate rock and sulphur on which to base the manufacture of cheap phosphates. The search is going on in some countries for these raw materials.

Revised Production Consumption for Chile July 30, 1952

Production	1950/51	1951/52	1952/53
Nitrogen (N)	268,070	271,696	277,920
Phosphoric Acid	16,540	20,873	24,019
Potash (P_2O_5)	9,871	11,526	14,000
Muriate and Sulphate of Potash (K_2O)			
Consumption			
Nitrogen	8,746	9,996	11,120
Phosphoric Acid	15,981	20,873	24,019
Potash	3,101	4,526	5,200

Fire Protection

(Continued from page 36)

openings including conveyors. Such walls, without openings or with approved wire glass windows, may shield against external exposure if construction is close to the property line where others have built or may build.

Interior bin walls and partitions should be of incombustible construction, preferably of reinforced concrete if materials subject to heating are stored in the area. The installation of numerous wood partitions, platforms, galleries and the like can lessen the fire safety of the incombustible structures even though the contents themselves are not flamable. Certain bituminous coated sheet metals should be avoided where the use of an incombustible building is indicated.

Separate, well-segregated, smaller buildings should be provided for the miscellaneous shops, garages, locker rooms and other appurtenant occupancies usually associated with this type of operation. This should apply as well for bag storage or bag washing (especially if nitre bags are handled rather than destroyed) and for bag printing operations unless printing is no more than a single press operation. The separate building requirements should be adhered to with respect to any amount in excess of a one day supply of the specific types of fertilizer materials know as Class "B" (fish scrap and meal, goat and sheep manure, linseed meal, etc.) and Class "C" (garbage tankage, lime, nitrates, bulk wool waste, etc.) unless incombustible bins or bagged and segregated storage can be provided. The bins should be of masonry with incombustible tops in the case of Class "C" materials. Good, easily erected, relatively inexpensive, all-metal buildings in a wide range of standardized sizes are now produced which, if properly spaced, afford excellent storage facilities.

Where space limitations are important it is to be remembered that many of the smaller separate buildings suggested can be segregated from each other or from a main building by appropriate masonry fire walls.

Equipment, such as electrical devices of all kinds, automotive equipment for use inside buildings, and heating facilities should be chosen with the specification that it conform to Underwriter's standards for the location and use contemplated.

Electrical wiring and devices should in all respects meet the minimum requirements of the National Electrical Code, and wiring should be in continuous conduit, metal molding or raceways, unless there is no low resistance ground available. Where open wiring must be used, it must meet Code requirements fully and be protected against mechanical injury. At many places about a Fertilizer Plant, electrical fittings, switches, panels and motors must be specifically protected against corrosion by properly chosen original installation, or else later by special maintenance. Approved dust-tight equipment will be indicated at some locations. If oil filled transformers or circuit breakers are located inside the building special precautions should be applied. Standard fire-resistive vaults should be provided where oil capacity of equipment is considerable, or drained curbed areas and special extinguishers for smaller units.

Combustibles may be ground in some cases, and finely divided materials present special fire or explosion hazards. Carbonaceous or nitrogenous materials, combustible in the dry natural state, present substantially increased hazard when ground, or as dust. Such an operation should be conducted in a segregated section, in tight equipment to confine dust, and with adequate dust removal equipment to deposit dust in outside collectors. Magnetic protection should be provided ahead of grinders to keep tramp iron from causing sparks, and open heating and electrical equipment should be excluded from the immediate area.

Automotive equipment for use in any building with combustible contents including bagged materials should be Underwriter's approved for such use, the chief requirement being a special type muffler to guard against passing flames or sparks. Separate storage should be provided for vehicles, out of the main plant area or properly cut off therefrom. Safe, remote gasoline-filling is essential.

Heating by steam or hot water is preferred and should be no problem in new plant design since by general industrial standards, the requirements for heat in the average fertilizer plant are relatively small. Automatic Underwriters' approved oil, gas and coal fired units and rather simple specifications for their installation are available. Efficient small central heating plants or small individual units are feasible depending upon the location of Office, Wash House and other areas requiring heat. Steam or hot water unit heaters supplied by such systems and equipped with dust-tight or explosion-proof motors where necessary, can be located for spot heating in portions of larger structures. The heater room should be separate or cut off by blank walls with outside entrance and with reinforced concrete ceiling if in a basement or multi-stored section.

Various approved gas unit heaters, and approved oil-fired space heaters, suitable for areas requiring local warmth are available to obviate the use of ordinary and makeshift stoves and salamanders with the attendant open flame, flue and other hazards. Special Underwriters' approved flues are available for use with limited-size gas devices requiring flues, to serve such devices safely without added chimney cost or ordinary stove pipe hazards.

Elevating and conveying equipment should be of incombustible construction throughout, except for any belting in belt-type conveyors or pulley driven systems. Elevator boots should be in readily accessible locations, and heads or boots should preferably have other than wooden pulleys.

Various features of equipment arrangement and guarding, exits, aisles, ramps, painting and lighting bear on the fire protection as well as on the personnel and industrial safety and

need not be pointed out to safety men.

As to fire protection, the greatest single deficiency charged against the fertilizer plants, as a group, is the deficiency in/or total absence, of outside fire protection. Two of the most recent fires classed as large loss disasters in fertilizer plants resulted in extensive destruction because of their location outside city limits, in areas beyond hydrant protection and requiring excessive hose runs by the City Fire Department. Enhanced exterior protection is vital to the average plant with its excessive combustible construction. It is a necessary adjunct to a modern fire-resistive type plant which, although designed for maximum resistance to, and limitation of, fire will still have numerous fire possibilities where adequate water will be welcome in emergency. In addition, proper exterior protection may reduce by half the fire insurance premium that would apply to an unprotected plant, and can be a factor in the securing of complete insurance coverage.

If a plant is within or near a city having a good public water supply, extension of that supply to serve properly located hydrants about the premises will afford the best and most common primary supply, and the least costly. A secondary supply is advisable and should be a requirement unless the plant is small, of good construction and not seriously exposed. Most often, industrial plants plan independent fire protection systems, sometimes of necessity because of location, and frequently to avoid placing entire dependence upon a public facility.

In any event there should be a primary supply maintaining continuous pressure on the system. In the absence of a reliable and feasibly accessible public water supply, a gravity tank or elevated reservoir may be used to supply adequate pressure and capacity. A tank or reservoir may be the most practical means of supplying a second source in the event of primary water shut-off or failure, or to supplement the primary supply in event the latter is overtaxed during an emergency period. The amount of water required will depend upon the size and construction of the plant and whether both automatic sprinklers and hydrants are supplied.

As a secondary supply to either public water or an elevated tank or reservoir, or as a booster where ample water is available but at low pressure, a private fire pump is ideal. Centrifugal pumps of approved fire service design, powered by electric motors, internal combustion engines, or steam turbines, with suction capacity adequate for the circumstances, are in common use. Where used in conjunction with primary city water, the pump suction supply must also be portable water, but, with an independent fire system, private reservoirs, tanks, ponds or rivers may be used.

Fire Mains should never be less than 6 inch, and should preferably be looped or circulating systems, with appropriate sectional control valves to afford repair or extension with as small a portion as possible shut off at any one time. Roughly, a 200 foot spacing of standard double hydrants will generally afford good exterior protection about large buildings and the smaller buildings should be within 100 feet of the nearest hydrant. Most readily avail-

able facilities are provided if each hydrant is equipped with a hose house with 200 feet of 2½ inch, cotton rubber-lined hose, nozzles, spanners, wrenches, lantern and such other equipment as may be desirable depending upon factors of construction and occupancy. The alternative is to have one or more hose reels suitably and conveniently housed, but delay is inevitable in getting such hose to the hydrants to be used and in attaching hose and nozzles.

Automatic sprinklers constitute the best and most reliable fire protection means. In effect they constitute a nozzle long enough and crooked enough to reach the seat of the fire and are ready for instant action at all times with limited water damage. When construction is fire-resistive or incombustible and contents are not flamable, sprinklers are generally omitted in well protected plants, but where existing properties are of combustible construction or have combustible occupancies, automatic sprinklers constitute the only effective means of overcoming the hazard of fire and the attendant complications.

If a sprinkler system is well laid out, with ample water supply, and properly maintained, it will not fail to extinguish or control fire except in very extreme circumstances generally attributable to human error. As to a frequently mentioned fear, or alibi, that automatic sprinklers may operate prematurely to cause damage when there is no fire, it has been determined recently (Factory Manual Group) that there is less than one chance in 8,000,000 of such premature operation from a defect of manufacture. When sprinklers operate, total damage is mostly from water, but such is the alternative to perhaps total loss if fire is unchecked, or much greater water damage if extinguishment is accomplished by hose streams. One hose stream discharges water equivalent to ten or more sprinklers, whereas five sprinkler heads or less extinguish 73% of reported fires under automatic sprinkler protection; hence the favorable regard with which sprinklers are held by Underwriters and protection men. In addition, new types of automatic sprinkler heads are becoming available that will in a majority of cases prove even more effective, or require less water than present designs. This will, in the near future, permit reconsideration of certain instances where automatic sprinkler installations were considered unfeasible.

Each sprinkler installation is a specific problem of engineering and installation which should be left to experts in that field. Such systems, including water supplies and alarms, should be considered, approved and installed on competent advice, with full cooperation of the interested Underwriters' representatives.

Standpipe and inside hose rank next to automatic sprinklers for inside fire control, and where water supply is available should always be considered. Frequently water supply may be inadequate for a sprinkler system or a standard yard hydrant system, yet may be sufficient for a standpipe installation especially of the size to supply 1½-inch hose for first aid use. Such connections may also be made to sprinkler equipment when taken from not less than 2½ inch pipe on wet systems. Any layout of inside 2½-inch hose connections should be considered for Public Fire department or plant fire brigade use only, and most locations will be better served by 1½-inch hose connections with properly racked 50-foot to 75-foot lengths of 1½-inch hose, so located that all portions of the premises will be within reach of an effective stream from the nozzle used. Such equipment is particularly valuable where there are substantial amounts of combustible material, or where relatively high combustible roofs may become involved. If fires are not caught in the incipient stage or are out of reach of hand extinguishers, the standpipe system is invaluable, with greater range and relatively unlimited discharge time as compared with the one minute or less action of the small extinguisher streams. With the available types of water-spray nozzles, such hose streams may also be used with safety and success on oil and electrical fires. In addition through the use of special injector nozzles and portable pails of air-foam solution, they can deliver substantial foam-type protection at locations where such smothering action may be advantageous.

Fire Extinguishers should be so located that at the average plant there will be one in each building, on each floor or deck, and, where the area is over 2,500 square feet one extinguisher should be provided for each 2,500 square foot area. Additional units should be provided in long narrow buildings or conveyor galleries so that the travel distance to an extinguisher will not be over 50 feet. They should be mounted or located in readily identified cabinets where they will be immediately accessible when needed, and appropriate types may be placed convenient to specific local hazards, supplementing a general extinguisher installation. Their value is in being where employees can use them to extinguish small fires promptly, without appreciable property loss or danger to personnel. In a large proportion of fires in sprinklered areas, the blaze is extinguished before sprinklers operate. Extinguishers or small hose are frequently used to overhaul fires that have been controlled by automatic sprinklers.

There are several types of extinguishers and variations within some types by different manufacturers. Basically their specification is Simplified as to suitability for A, B, C, or C type fires, respectively:

Those in ordinary combustibles, quenched by cooling such as wood, paper, cloth;

Those involving paint or oils where a smothering action is efficient;

Those in electrical equipment, where a non-conductive agent is necessary.

The water type, either pump-operated or with the water expelled by a gas cartridge, and the familiar 2½ gallon soda-acid type are the most common and effective devices for Class A fires. In addition, the pump type and the gas cartridge operated extinguishers may be filled with water in which calcium chloride has

been dissolved to prevent freezing in locations where an anti-freeze type extinguisher is required. There is also an anti-freeze cartridge operated type filled with a solution suitable for minor Class B fires as well as Class A fires. In general, these extinguishers have a range of about 40 feet and are effective for one minute.

Various foam, carbon dioxide and dry chemical extinguishers are available for Class B. fires, the carbon dioxide and dry chemical types also extending their field of use fulness to gas fires and to Class C. electrical fires. The foam extinguisher is effective on fires in vessels or spills of a few square feet area and the solution has good range, sticking and floating qualities.

Carbon dioxide extinguishers are available in a wide range of sizes, but those containing fifteen pounds of carbon dioxide with a total weight of about fifty pounds are about average for ordinary use. It is the cleanest type to use but must be employed at very short range in relatively still air, and the duration of discharge is short.

The dry chemical type extinguisher which contains a powder expelled by gas has decidedly better range and fire-killing power than the carbon dioxide extinguishers. It has greater utility on gas, gasoline and oil fires, and on hot oils or tars where other agents would cause boil-over. They are also effective on electrical fires and the combined oil electric fires of transformers and other electrical equipment, but their use is not recommended for intricate electrical apparatus where the dust would be a problem or relays or other delicate electrical contact points.

Also effective on small oil or electrical fires is the vaporizing liquid type extinguisher, now chiefly recommended only for small electrical apparatus fires. The familiar one quart pump gun or the ½ to 3 gallon stored air pressure units actuated by valve and short hose have good though limited specific use, but care must be employed in their maintenance and use to guard against the potential personnel hazzard of carbon tetrachloride.

Watchman Service is a badly neglected feature in the fertilizer industry protection facilities. In fact, in the few cases where a watchman is employed little is gained. This is not a job for a superannuated pensioner, a cripple or incompetent. The watchman, or guard, by whatever name known, is entrusted with the fire safety of the plant during all shutdown periods, generally totalling far more hours than the plant is operating. Aside from perhaps several other duties, the watchman should thoroughly understand ordinary hazards, each unusual hazard possibility in the plant, and the correct procedures in event of trouble. He must be able to discover and correct conditions that may cause a fire, and know when to summon help. He must be physically and mentally able, alert, calm and independent. He must be thoroughly familiar with every piece of fire equipment on the premises, including sprinkler system and fire pump operations if such are provided.

Generally one hour rounds are made nights, and at two-hour intervals during the inoperative days, with a most important first round of a complete general checking nature immediately after the plant shuts down. Either portable clock stations, or central station watchman service system where such is available should be laid out to assure foolproof coverage of the entire premises with every room in view. In the case of small special hazard rooms or buildings, a station should be located at the entrance door.

Even with a good man and a well engineered route, considerable time should be spent familiarizing the man with the plant and its various safety facilities in order that the plant and the job of all concerned may be left in competent hands.

A fire brigade should be considered a necessity, whether it consists merely of a squad in a small factory or combined departmental squads constituting a complete fire company in extensive plants. Where necessary, the functions of the fire brigade may be assumed by an enlarged safety team.

Regular full time workers should be trained in fire prevention and fire fighting. These men should know the plant and its hazards thoroughly, and be well practiced in the use of the various types of extinguishing devices on the premises. In larger operations several persons will have to be assigned special tasks, such as the operation of fire pumps, alarm and evacuation procedures, shutting off gas and power in affected areas (except power to fire pump) and other performances as required, according to the size of the plant.

If the plant operates on shifts, captains and brigades should be appointed and trained for each shift, so that in general a fire brigade member will be on duty at all times in each section of the plant.

Well trained employees, organized into squads of a few men in each department, may in a few moments on one occasion far more than repay for all the paid time spent in training.

Summarizing in conclusion:

It is evident much improvement is indicated in design features of the average fertilizer plant to assure good construction, equipment and protection features. By means of non-inflammable construction and space or fire wall segregation of component parts, the loss liability may be greatly reduced. By reducing combustible material in the minimum and limiting areas subject to one fire, it becomes as simple as "big pile, big fire; small pile, small fire."

Original plans should contemplate complete protective facilities from water supply to fire brigade, including automatic sprinklers in important combustible buildings or over combustible occupancies, standpipes, extinguishers and watchman service. Substandard existing plants may be worthy of reconsideration of the same protective features, and long range planning for improved additional facilities, to afford space or masonry wall fire barriers. Gradual replacement of inferior construction or equipment can be planned

to completely change the plant classification from poor risk to good risk, with benefits accuring additional to better rates, reduced liability and full value insurance coverage.

There is false economy in poor construction and protection. An efficient and lasting plant operation cannot be had without due regard to the excellence of original design, structural features affording safety, and adequate subdivision and protection to guard against fire of consequence and the associated perils and the consequential hazards therefrom.

Around The Map

(Continued from page 45)

ed house-organ called "V.C.News." This is now five years old and the following, gleaned from the anniversary issue is interesting:

Five years have passed since the first copy of the V-C NEWS reached you in 1947. We recall for you now the purpose of our magazine as set forth in that first issue.

"The purpose of this modest publication is to afford a medium for the collection and dissemination amongst the V-C employees of such news items and information concerning the company and its employees as may be helpful toward a fuller understanding and a broader grasp of the nature and extent of the various activities of our numerous departments, plants, sales offices and other units; to broaden and strengthen the acquaintances and friendships amongst the employees; to promote friendly teamwork and stronger resolves in all undertakings; to stimulate the aspirations for higher services and greater achievements to the betterment of the individuals, the company, its customers and the public generally."

UTAH

Stauffer Chemical and Garfield Chemical have christened their joint $10,000,000 superphosphate subsidiary near Salt Lake City, reported here in August. It will be called **Western Phosphate, Inc.**

Trends

(Continued from page 41)

recognized. Without the use of some plant food, very few, if any, farmers would have been able to continue in production. In fact, until recently, most of the fertilizer consumed in the United States was used in the South.

What has been the trend?

In 1934, the South used about 65 percent of all the fertilizer that was used in the United States, including territories. This dropped to 51 percent in 1951 but meant a total of 10,675,000 tons. Incidentally, the total fertilizers used in the South in 1951 was more than was used in the entire United States in any one year prior to 1943.

Although the South has used increasing amounts of fertilizer each year, the rate of increase has not been as great as that in some other parts of the country—notable the corn belt area and along the Pacific Coast. Does this mean that the South is making optimum use of fertilizers and a definite need for larger quan-

FERTILIZER CONSUMPTION—TONS

Year—ending June 30	U. S.	South	Percent of Total
1934	5,579,000	3,609,000	65
1939	7,617,000	4,865,000	64
1945	13,466,000	7,241,000	54
1951	20,989,000	10,675,000	51

tities no longer exist? The answer is definitely no, although the potentials may look more promising in certain other areas.

As is shown in the following table, yields of most crops in the South are about one-third to one-half of their potential yields. Potential yields being based on proven research results.

A glance at the table emphasizes two important things—low average application of fertilizers and low yields. Only tobacco, fruits and nuts, and vegetables approach adequate fertilization and high yields.

I should like to emphasize at this time that this situation applies not only to the South but to the United States as a whole. Adequate and proper use of fertilizers will increase yields. The problem is not necessarily experiment station recommendations, particularly here in the South, because most states already are recommending about twice as much fertilizer as is being used. Not only have higher rates been recommended but the results have been proven in the field.

Experimental data throughout the South show that on the average, 2 pounds of nitrogen will produce a bushel of corn when other plant foods are adequate. Corn acreage in the South is around 24 million acres with average yields of only 26 bushels per acre. This corn has been fertilized, on the average, at the rate of only 15 lbs. N, 13 lbs. P_2O_5, and 9 lbs. K_2O per acre. Potential corn yields of about three times the present average yield will never be reached without the use of adequate fertilizers.

Experiment station data also show that cotton yields can be materially increased by the use of adequate fertilizers. Over 21 million acres were planted in the South last year and the average rate of fertilization was only 14 lbs. N. 14 lbs. P_2O_5, and 9 lbs. K_2O per acre. The average yield was estimated to be about one-third of the potential yield if all acres had been properly fertilized.

In the past, pastures were a neglected crop in the South and only recently have recommended amounts of fertilizers been used on any sizeable acreage. Fortunately, grassland farming is rapidly forging to the front and in my opinion, represents the number one opportunity in the Southern states. Over 154 million acres are involved and current average rate of fertilization is very, very low—only 0.4 lbs. N, 5 lbs. P_2O_5, and 0.8 lbs, K_2O per acre. Numerous experiments show that the proper use of fertilizers is the key to pasture production and yields of 500 to 600 pounds of beef per acre are not uncommon.

In recent years, outstanding progress has been made in putting recommended practices in to operation. Many farmers in the South are producing over 100 bushels of corn per acre. Two bales of cotton per acre are not uncommon and a revolution is taking place in pasture development. But, on the average, we have reached only one-third to one-half of potential yields.

The key to increased yields and better living is the adequate and proper use of chemical fertilizers; the significance of which this country cannot afford to underestimate. Thus, chemical fertilizers will become more important in the future and I am happy to say that this has been recognized by the recently announced USDA-Land-Grant College Fertilizer and Lime Use Program. All of us can be of real service by helping to implement this program.

Fertilizer Trends

In meeting current and potential demands for fertilizers, revolutionary changes are taking place. Not only is fertilizer production rapidly increasing but many new developmets are occurring in manufacturing and distribution.

New all-time records have been set annually in fertilizer consumption since 1939. Official figures for the year ending June 30, 1952, are not yet available but estimates indicate a total consumption of about 22 million tons. This represents an increase of approximately one million tons or 5½ percent over the previous year. This is about three times as much commercial fertilizer as was used in the pre-war 1935-39 era.

For next year, ending June 30, estimates indicate an increase in fertilizer production of from 10 to 15 percent over last year or a total of between 24 and 25 million tons.

FERTILIZER USE AND CROP YIELDS IN SOUTHERN REGION 1/

Crop	Acerage	Current Fertilizee Usage Lbs. Per Acre			Percent of Production Potential	Average Yields Per Acre
		N	P_2O_5	K_2O		
Pastures	154,082,000	0.4	5	0.8	....	....
Cotton	24,976,000	14	14	9	38	640 lbs.
Corn	23,899,000	15	13	9	34	26 bu.
Wheat	15,869,000	2	4	2	38	14 bu.
Hay	13,075,000	1	11	3	....	1 Ton
Sorgum	5,787,000	1	2	0.6	....	....
Oats	5,141,000	8	9	6	40	25 bu.
Peanuts	2,296,000	3	15	9	61	807 lbs.
Vegetables	1,749,000	43	72	50	....	....
Fruits & Nuts	1,891,000	42	43	46	....	....
Tobacco	1,453,000	37	89	64	78	1201 lbs.
Soybeans	1,092,000	0.7	10	8	52	17 bu.
Rice	1,527,000	11	8	4	54	17 bu.

1/ Fertilizer Use and Crop Yields in the Southern Region, Report No. 1 of the Fertilizer Work Group, National Soil and Fertilizer Research Committee, July 1951.

This is assuming that no major strikes are encountered in the production field and no drastic changes occur in the international situation. For the first time in history, fertilizer tonnage is approaching the tonnage of liming materials used on American farms.

Approximately 1,425,000 tons of nitrogen were used last year which represents an increase of about 11 percent over the previous year. For the current season, estimates indicate another increase of about 11 percent or a total supply of 1,585,000 tons of nitrogen. The expected increase of 160,000 tons this year is alone more nitrogen than was used in the states of Ohio, Indiana, Illinois, Michigan and Wisconsin combined, during the fertilizer year of 1951.

Last year, the fertilizer industry was faced with a shortage of sulfur which limited the production of phosphate fertilizers. The situation has improved somewhat this year and the outlook is for an increase of about 10 percent in phosphate production. This means a total of 2,465,000 tons of P_2O_5 or an increase of 230,000 tons over last year.

In recent years, there has been an increased demand and also an increase is production of triple superphosphate and other concentrated phosphate materials. Next year, and in the future, an even larger proportion of the phosphate fertilizers will no doubt be in the form of more concentrated materials.

Rapid expansion and development has taken place in the domestic potash industry in the United States and record quantities of potash are being produced each year. Production last year, including both domestic and imports, resulted in a total of about 1,585,000 tons of K_2O for agricultural purposes. The outlook for this year is an increase of about 17 percent or a total of 1,850,000 tons K_2O. This is an increase of 265,000 tons over last year and will again set a new all-time high.

Fertilizer Goals for 1955

Although fertilizer production has been increased tremendously in the past few years, definite increased production goals have been set to meet the demands in the future.

Production goals set by the U. S. Department of Agriculture and Defense agencies call for 70 percent more nitrogen, 55 percent more phosphate and 51 percent more potash than was used during the 1951 crop year.

The goal for total nitrogen production in 1954-55 has been set at 2,930,000 tons of which 2,185,000 tons are for agriculture. Sufficient production capacity to meet this goal has been authorized by Federal agencies and it is expected that the goals will be met in full by the nitrogen producers. Construction of new plants and expansion of old plants is in various stages of completion. This new production involves 25 new nitrogen plants scattered throughout the country with the major concentration being in the lower Mississippi Valley region. Some of the increased nitrogen production will materialize this year,

an additional quantity next year, with the total program to be completed in 1955.

The phosphate expansion program followed immediately after the nitrogen program. The goal for 1955 was set at 3,600,000 tons of P_2O_5 with 3,485,000 tons for fertilizers. The phosphate expansion program has not yet been completed but it is evident that the 1955 goal will be met in full. Many new plants are involved including new processes which will require less sulfur per unit of available phosphate. Major expansion is expected in the production of triple superphosphate and other high analysis phosphate materials. A new development for this country will be the commercial production of nitraphosphate fertilizers by the acidulation of rock phosphate with mixed acids, probably nitric and sulfuric. Several nitraphosphate plants are now under construction.

The potash goal for 1955 has been set at 2,185,000 tons K_2O for agricultural purposes. The first commercial production of potash in this country began in 1915. Later, in 1931, shipments were made from the newly discovered potash deposits near Carlsbad, New Mexico. Since that time, domestic potash production has increased in this country at a phenominal rate and the United States has been made relatively independent of foreign supplies. Production is still increasing and two new mines are just coming into full production. Thus, the potash goals seem assured and no doubt, some potash will continue to be imported.

Increased production and consumption of fertilizers has resulted shift in the percentage of fertilizers used on the major crops. In 1927, about 22 percent of all fertilizers was applied to corn and this has in-in other changes. There has been a creased slightly to 25 percent last year. Fertilizers used on vegetables have increased from 5.3 percent in 1927 to 9.3 percent in 1950. Wheat has changed very little from 10 percent in 1927 to 9.4 percent in 1950. Cotton, however, has decreased from about 31 percent in 1927 to 9.3 percent in 1950. In 1927, pastures received so little fertilizer that no estimate is available but use on pastures increased to 2 percent in 1938 and nearly 12 percent in 1950. This is a phenominal increase in pasture fertilization and the trend will continue.

As more concentrated fertilizer materials become available, the average plant food content of mixed fertilizers likewise increased. The average total content of N, P_2O_5 and K_2O increased from 19.9 in 1940 to a new high of 24.19 last year—an increase of 21.6 percent. Even more rapid progress is expected in the future as higher analysis materials become available. In the past, the ratio of N to P_2O_5 to K_2O in mixed fertilizers has been more on the order of 1-2-1 or 1-2-2. The present trend is definitely towards a 1-1-1 ratio.

Advances in the manufacture, distribution and sale of fertilizers have been reflected in relatively low prices for fertilizer. According to the latest U. S. Department of Agriculture index numbers of prices paid by farmers, fertilizer prices increased from 100 in 1910-14 to only 153 last year. In fact, fertilizer prices have increased less than any other major commodity entering into production costs.

Thus, in closing, I believe that you will agree that the present era marks a historical point in the development, use and manufacture of chemical fertilizers. An era comparable perhaps in historical and beneficial significance to over 100 years ago when the fertilizer industry first started. From a humble beginning using primarily by-products from other industries, the manufacturer of fertilizers has progressed until, today, it represents one of the largest units of the heavy chemical industry. Revolutionary chemical and technical advancements are taking place and in the future, chemistry will play a greater role than ever before.

Chemical fertilizer is the key that will unlock the door to continued agricultural abundance, lower production costs and a higher standard of living. Adequate use of fertilizers —not production—is the problem which remains to be solved in the future.

Dickerson Incorporates

The Dickerson Company, Philadelphia brokers, has become The Dickerson Company, Inc., and its overseas operation becomes Dickerson's Overseas Company, a division. No change has been made in management or facilities.

Looking Forward

(Continued from page 22)

Nitrogen Expansion

During World War II, domestic agriculture used on an average about 550,000 tons N in nitrogenous fertilizers. That was all that was available. A substantial part of the supply was imported from Chile and Canada. In 1955, synthetic ammonia facilities alone will be capable of producing about 2.7 million tons of N. This enormous expansion is directly attributable to the persuasive representations and claims of the U. S. Department of Agriculture. Twenty-five new plants are being built to supply these expanded needs. Most facilities are being constructed and financed actively in manufacture and distribution of mixed fertilizers.

In the past, the fertilizer industry looked to other segments of the chemical industry for supplies of nitrogen chemicals. There was no competition between them in the production of mixed fertilizers. This situation will soon be vastly different. It is reported that one of the major traditional suppliers of nitrogen chemicals is embarking on the large scale production of mixed fertilizers. By a proper integration of its facilities and resources, it should be able to produce mixed fertilizers via the nitrophosphate process cheaply. Distribution facilities will be needed but there is little doubt but what these can be developed or acquired by negotiation. A study of production economics will readily confirm the validity of these observations.

A more striking development is the entry of the petroleum industry into the nitrogen picture. It is already known that Shell Chemical Co., Phillips Petroleum, Lion Oil Co., Sid Richardson, Atlantic Refining Co. and Cities Service either have or are building ammonia plants. Other petroleum firms are anxious to participate in the production of nitrogen fertilizers. To ensure outlets for their products, these newcomers to the fertilizer industry must either tie in with existing elements of the industry or develop captive or other markets. Some of these firms are prepared to finance in whole or in part the construction of new mixed fertilizer plants. Thus, we find that the chemical and petroleum industries are becoming active participants in the fertilizer business.

This development cannot be overemphasized because the unit cost of N is the greatest item of cost in making mixed fertilizers. Even a casual glance at some cost figures would suffice to establish the economic advantage of having a captive or integrated source of nitrogen. Using current prices, the FOB cost per unit of N in various forms is approximately as follows:

	Cost per Unit N	Cost of N in Ton 12% N Fertilizers
Ammonia from completely amortized plant	$0.50	$6.00
Ammonia from partially amortized plant	0.75	9.00
Merchant ammonia	1.00	12.00
ANL Solutions	1.20	14.40
Ammonium nitrate	2.00	24.00
Ammonium sulfate	2.20	26.40

It is clear from the preceding that substantial economics in production can be achieved in a completely integrated plant. With suitably designed facilities and under appropriate conditions, it is practical to prepare ammonium nitrate or sulfate in conjunction with the manufacture of phosphatic fertilizers in such integrated plants. The above data on nitrogen costs constitute support for the earlier observation regarding the ability of a large nitraphosphate producer to negotiate or develop distribution channels. A dry mixer, by becoming an associated distributor, may be able to contract for mixed fertilizers from a low cost producer cheaper than he can make them.

Phosphatic Fertilizers Goal

At a recent meeting of the NPA Phosphatic Fertilizers Industry Advisory Committee, Department of Agriculture representatives presented requirements for 3,485,000 tons P_2O_5 in 1955. This is about 55 percent more than the 2,235,000 tons P_2O_5 which was delivered during the 1950-51 fertilizer year. The enormity of such an expansion program cannot be visualized until calculations are made of what is involved in a way of new sulfur and sulfuric acid requirements, as well as new facilities. Statistically, the situation can be presented thus:

	P_2O_5
Present, 1951-52 P_2O_5 supply	2,000,000 tons
Required 1955 supply	3,485,000 tons*
Needed expansion	1,485,000 tons
Sulfuric acid used 1951-52 (basis 100%)	4,000,000 tons
From brimstone	3,000,000 tons
From smelter, spent, etc. acids	1,000,000 tons
Sulfuric acid equivalent of expansion	2,800,000 tons
Sulfur equivalent of expansion	930,000 tons
Sulfur saved by limitation Order M-69	133,000 tons

*Does not include ground phosphate rock or imports.

The Defense Production Administration has not yet announced a program determination for phosphatic fertilizers although a preliminary target may be established at any time. A major problem confronting DPA is to stimulate the production of sufficient sulfur or sulfuric acid to permit a realization of the requested P_2O_5 goal or any approved part thereof. From present indications, it appears that enough sulfuric acid can be made available to meet expanding industrial and agricultural requirements only by encouraging conservation practices and exploiting production of acid from non-brimstone sulfur.

Methods of Attaining Expansion

A wide variety of methods can be used to attain the claimed P_2O_5 expansion. Each fertilizer firm would have its own pet ideas as to how this can best be accomplished. Here, emphasis is placed on procedures which can be defended on the basis of equitable treatment, national defense, or sulfur conservation.

1. Restitution of full sulfur bases.

2. Dual use of sulfuric acid to produce wet phosphoric acid and uranium.

3. Conservation of sulfur through nitraphosphate production.

Illustrative Production Scheme

In the absence of a DPA program determination or of forward-looking industry plans, it is difficult to blueprint the nature or magnitude of any expansion program. Assuming for purposes of discussion that the procedures suggested above are used in the formulation of an expansion program totalling 1,485,000 tons P_2O_5, one of the numerous schemes for realizing such a production is as follows:

	Tons P_2O_5
A. In existing facilities (includes restitution)	2,200,000
B. From new wet phosphoric acid and triple superphosphate plants having AEC endorsement (mostly sulfur)	420,000
C. From nitraphosphates, mostly by present P_2O_5 producers. Involves 133,000 tons sulfur or 400,000 tons sulfuric acid for nitric-sulfuric acid acidulation	400,000
D. From new plants or expansions based on non-brimstone acid	350,000
E. From alkali or other treatment of phosphate rock	115,000
	3,485,000

Such an expansion program would require an additional supply of 546,000 tons sulfur (133,000 tons for restitution, Item A; 280,000 tons for Item B; 133,000 tons for Item C). An additional supply of 700,000 tons non-brimstone sulfuric acid will also be needed for new plants and expansions, Item D. This acid will have to come from pyrites plants, smelters, natural gas, refinery gases and spent acids. Of course, in final development of the program there will be considerable substitution of sulfuric acid or sulfur in each category.

Wet Phosphoric Plants Having AEC Support

In general, it takes about 10 to 15 percent more sulfuric acid to produce P_2O_5 by the use of wet phosphoric than by the production of ordinary super-phosphate. It would consequently be difficult to support new and large wet phosphoric acid plants on basis of P_2O_5 alone in times of a sulfur stringency. When, however, such plants make a dual use of acid to produce uranium as well as phosphate fertilizer, they deserve most favorable consideration. Such a course of action is not without precedent. The delivery of acid to TNT or smokeless powder plants has always received top priority. Production of atomic weapons would be expected to get the same high priority as manufacture of traditional military explosives.

Because of the seemingly high importance of plants that can produce both needed uranium and phosphatic fertilizers, there is an implied obligation to provide such new facilities with necessary supplies of sulfur. Currently this feature constitutes an attractive inducement which will be limited by DPA determinations and availability of sulfur. The AEC wants it to be emphasized, however, that the subject wet phosphoric acid plants are part of a required P_2O_5 program for which NPA and DPA have primary responsibility but in which

AEC has a deep interest insofar as uranium recovery is concerned.

Nitraphosphates

The production of nitraphosphates has been widely advocated as a sulfur conservation measure. Indeed it has such potentialities and deserves every encouragement. From mathematical and conservation viewpoints, the desired expansion in production of phosphatic fertilizers could and should be achieved with currently available and envisioned sulfur supplies through the production of nitraphosphates. In a competitive economy, however, there are economic problems, geographic considerations and company objectives that have to be considered.

Depending on modifications of the nitric acid acidulation process, it is feasible to conserve from 33 to 100 percent of the sulfuric acid that is generally used to make phosphatic fertilizers. From the viewpoint of sulfuric acid conservation, acidulation with nitric-phosphoric acid mixtures permits an increase of about 50 percent in P_2O_5 production, while the use of a nitric-sulfuric acid mixture results in doubling the P_2O_5 output. In the more complicated process involving the use and recycling of gypsum, no sulfuric acid is needed. Here, however, an integrated ammonia facility must be installed.

From the viewpoint of sulfur conservation, it is interesting to determine just what is involved in the way of nitraphosphate plants and finances to save 400,000 tons sulfuric acid or 10 percent of 1950-51 usage. Here, it will be assumed that a mixture of nitric and sulfuric acids will be used for the acidulation of phosphate rock. Ordinarily about 800,000 tons of sulfuric acid (100% basis) would be required to produce 400,000 tons P_2O_5. By the use of the suggested mixed acid it is feasible to save half of the sulfuric acid provided 400,000 tons N for acidulation and ammoniation are made available.

Assuming the manufacture of a nitra-phosphate having a 1:1 ratio (e.g. 12-12-12 mixed fertilizer), then 200,000 tons N as nitric acid (=900,000 tons nitric acid) and at least 200,000 tons N as ammonia will also be needed. From the viewpoint of individual plants and production, let us assume:

A. An average sized nitraphosphate plant of 150,000 tons gross
B. Production of a 12-12-12 fertilizer, then output of P_2O_5 in each plant will be 18,000 tons

Each plant producing 150,000 tons nitraphosphate will need a supply of 18,000 tons sulfuric acid (6000 tons sulfur base) and about 25,000 tons anhydrous ammonia. A smaller plant of 60,000 tons gross capacity would produce 7,200 tons P_2O_5 and require only one standard 50 tons per day ammonia oxidation unit.

About 550,000 tons of liquid ammonia would be needed to conserve 400,000 tons sulfuric acid (basic 100%) or 133,000 tons of sulfur. To the extent that byproduct ammonium sulfate is used in the nitraphosphate process, there would be a corresponding further saving in sulfuric acid.

From the preceding it is clear that the fertilizer manufacturer who has a use base for sulfur and an assured supply of ammonium sulfate is in an advantageous position. His assets may be just as valuable to a nitrogen producer as the latter's ammonia production is to him. There is no question but what an integration of activities will be conducive to more profitable over-all operations because of the very great increase in output of mixed goods from an established sulfur base, the large savings in transportation costs, and the greater margin of profit per ton of product.

A nitraphosphate plant, particularly if it is integrated with ammonia and sulfuric acid facilities, costs a lot of money. A plant of 150,000 tons gross (12-12-12) capacity would cost in the neighborhood of \$12,000,000 or about \$80 per annual ton. Without acid or ammonia facilities, but with ammonia oxidation (AOP) units, it would cost from 4 to 4.5 million dollars. Because such plants are designed to operate around the clock and calendar with a minimum of operating labor, appreciable economies in production costs can be realized. Other savings may come from integrated production of ammonium sulfate and nitrate. Such plants would probably receive the benefits of a liberal tax amortization and it would be surprising if they could not be written off within a 5 to 10 year period by virtue of lower production costs.

Position of Dry Mixers

During the past year the fertilizer mixer firms who number about 800 have learned how greatly they are

dependent on the distribution policy of the 90 acidulator firms. If the latter had not chosen to follow a generous policy, many of the fertilizer mixers would have had to suffer extreme hardship. Although the Defense Production Act provides for remedial measures, the issuance of orders takes time and study. After NPA closes up shop, there will be no major deterrent for large producers—and there will be large producers—to arrange for integrated distribution outlets. This will tend to minimize fluctuations in business and thus permit establishment of sounder production programs.

The dry mixer has valuable assets and these should not be minimized. He will unquestionably have an important role to play in any future organization of the fertilizer industry. Just as the ammonia producer needs the fertilizer manufacturer, the latter needs grass roots distributors. Integration throughout the industry is the trend and it makes sense. The fertilizer mixer has mixing and storage facilities and trucks. He knows the farmers in his area, as well as the local banker. He can arrange for credit and render special services. The large producer must either use these assets or duplicate them. The mixer, like the distributor of automobiles, can enjoy an area monopoly for a producer. He can emphasize sales and services, thus relieving the producer of this expense. He will have an obligation to assume a share of the increasingly important storage problem which, because of the seasonal characteristics of the industry, is growing in proportion to production. In return he should probably be able to obtain mixed fertilizers as cheaply as he can make them. It is not at all improbable that an integrated distributor will be able to achieve greater economic stability and equal rewards with less financial risk.

Looking Forward

The Atomic Energy program, the need for producing nitraphosphates as a sulfur conservation measure, the entry of the petroleum and chemical industries into the fertilizer business have combined to create a revolutionary situation in the fertilizer industry. It is not possible to blueprint details of the upheaval of its aftermath. Major changes are destined to occur. There will be enormous low-cost producing centers. These will prefer to depend on integrated distributors. Because of historic development and other factors, the greatest resistance to change will be in the Southeast.

According to the Department of Agriculture there will be a great increase in fertilizer usage. At the same time there is no certainty that supplies of sulfur can keep pace with the growing requirements. A restitution of full sulfur base to acidulators will add only 10 per cent (200,000 tons P_2O_5) to current production. The construction of a few huge wet phosphoric acid plants will involve as much sulfur as the entire restitution program. The control of a fully integrated nitraphosphate facility using nitric-sulfuric mixtures for acidulation will permit a 100 percent increase in production of P_2O_5 and mixed fertilizers without the use of additional sulfur.

The handwriting has been on the wall for some time. It is not surprising that the chemical and petroleum industries were first to read it. These industries have great financial resources and are accustomed to operating in a changing and competitive environment. They have taken the initiative and it has aroused the fertilizer industry. Now is the time for the progressive elements of the fertilizer industry to plan, negotiate and act. It is later than most folks think.

Harte Licensed For Davison Process

The John J. Harte Company, Atlanta, Ga., has been granted non-exclusive rights to license manufacturers to use The Davison Chemical Corporation's process for the manufacture of homogenous granulated mixed fertilizers, it was announced by Davison. Patents on the process have been applied for.

In making the process available for use of other manufacturers in the fertilizer industry, Davison felt that an engineering organization with experience and background in the fertilizer industry was best fitted to facilitate licensing agreements.

OBITUARIES

Lawrence Roberts Carton, 66, former manager of the Eastern fertilizer division of Swift & Co., retiring in 1935, died in his sleep at his Baltimore home October 23 after a long illness.

Key Compton, assistant salesmanager Southern States Phosphate and Fertilizer Co., Savannah, died in a plant accident November 1.

Stanley Ellis, 48, son of Ray C. Ellis, Jeffersonville Fertilizer plant of Indiana Farm Bureau, suddenly in Los Angeles.

Richard D. Schultz, son of A. A. Schultz, Reading Bone Fertilizer Company, Reading, Pa., was killed October 10th in a plant accident.

RANDOM *Notes & Quotes*

Folks at Foremost Fertilizer in Florida not so long ago opened up a car of ammonium nitrate, and there was a chipmunk, which had been in there nine days without food or water, and in the midst of that nitrate. W. J. Belding and Sam Phillips took him in hand, and he's doing all right we understand.

* * *

Marianna, Arkansas, people opened their eyes wide when they saw a field of cotton that had never been cultivated. Francis J. Williams of the Cotton Branch Experiment Station there just cut the rows to 20 instead of 40 inches, used Chloro IPC at six pounds per acre . . . and got more than a bale per acre, with never a hoe near the place.

* * *

Narrow rows reminds us of an idea American Cyanamid agronomists have come up with to cut the high cost of soil conditioner. Simple. Just put conditioner on a narrow strip where the plants are!

* * *

On Broadbalk Field at the Rothamsted Experiment Station, England, the 108th crop of wheat is growing since 1843. This is an extension of the classic Lawes and Gilbert experiment, which shows wheat growing on land that never has had plant food added—but a lot more on land with fertilizer, and no manure since 1839. Fact seems to be that fertilizer and manure do about the same job . . . generation after generation on the same soil.

* * *

Here's a tale of a former county agent. It sounds at first blush as though his early training got out of hand, because he loaded 1800 pounds of fertilizer and 18 tons of manure on six-tenths of an acre after turning under a heavy green manure crop of heavy winter vetch. Came the drought. His tobacco kept growing. It went to seven feet high. As many as seven of the upper leaves were cut when it was topped. It got yellow halfway up the stalk . . . but when the rains came it turned green again almost to the ground. It happened in Danville, Kentucky, and the man is George D. Corder, field agent in agronomy for the University of Kentucky.

* * *

Seems that rice lands in Arkansas go haywire every third year and produce an undesirable red rice unless you rotate. E. H. Nixon of those parts turned his rice paddy into a fish farm one third year—and was startled at the rice crop he got the next season. Now the whole area is raising fish. They buy them when the price is low, nurture them carefully in their ex-rice fields, sell when the price rises . . . and some grow as high as 700 pounds of rice to the acre afterward. They harvest the fish by draining the field. No overhead!

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